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INTERNATIONAL PORTRAIT SERIES

No. 1

ANDREAS VESALIUS

(1514-1564)

Principal Work: De Humani Corporis Fabrica, 1543

The International Journal of Orthodontia

Editor: Martin Dewey, D.D.S., M.D.

VOL. I ST. LOUIS, FEBRUARY, 1915 NO. 2

ORIGINAL ARTICLES

AN INTERNATIONAL PORTRAIT SERIES.

By B. E. Lischer, D. M. D., St. Louis.

TO ASSIST in the unfurling of a new banner to the breeze of progress is a pleasant privilege, particularly when banners are few and the cause a worthy one. I therefore respond most willingly to the editor's invitation to contribute to an early number of *The International Journal of Orthodontia* by inaugurating an international portrait series.

Every student of the history of our art soon finds himself interested in the lives of the pioneers who were instrumental in promoting its progress. Hence a carefully edited *Portrait* and *Brief Biographical Series* will, undoubtedly, be welcomed by many. But such a series presents two main difficulties: First, it compels us to distinguish between men of temporary popularity and those of enduring fame; and second, portraits of many worthy leaders of thought need yet to be "discovered" in the libraries of Europe and America.

Few men will deny the value of historical knowledge because, as Emerson very wisely said, "to know the history of a science is to know the science." The story of man's struggle with his environment, with its phenomena of life and death, deformity and disease, poverty and crime, mystery and ignorance, will not let us accept the world-like "patient beasts". As long as the human mind is capable of intellectual and moral progress, as long as our "curiosities outrun our comprehensions and our aspirations shame our attainments," just so long will it diligently explore all regions to which its power can reach.

And if we adopt a rational point of view, "we have an endless task to explore the region which is ours—the world of nature and the world of man, the majesty of the starry heavens above and of the moral law within." And what a beautiful story it is! It reads like a "gospel of endless advancement, that faces the future with a passionate hope, and sees in every achievement of the human mind and heart a broken gleam of the glory that is yet to be.

It invests even the crude, bungling struggles of the race and stamps them with the sacred breast-plate of prophecy."

It is one of the commonest and most unfortunate errors of our judgment to assume that our predecessors were not perplexed by problems on every side, that we of the present generation alone were progressive. Think of the many theories which our ancestors held which have already been abandoned. But why so many theories? Because "the Greek had, it seems, the same fellow-beings as I. The sun and moon, water and fire, met his heart precisely as they meet mine. I feel the eternity of man, the identity of his thought."

Andreas Vesalius.

At first glance the reader may well wonder why the founder of anatomy was chosen for the first number of the series. My reply is the following statement, made by Professor Gies, of Columbia University, in one of his recent valuable contributions to the "Biochemical Study of the Saliva and the Teeth."

> "Ignoring 'fads and fancies,' and speaking of facts—dentistry is a *natural* branch of medicine, and the biological principles of dentistry deserve, and should receive, special attention in formal medical instruction."

In other words, leaders of thought in the related medical sciences have contributed very liberally to the substantial progress of orthodontics. Furthermore, the four hundredth anniversary of his birth was only recently observed by various scientific associations and journals.

Vesalius was born December 31, 1514, in the city of Brussels, Belgium. He was educated in the schools of Brussels and at the University of Louvain. In 1533, at the age of 18, he went to Paris to pursue the study of medicine. Subsequently he taught anatomy at Padua. It was here that he received his degree of Doctor of Medicine in 1537, and was elected to the chair of surgery.

Prior to his entrance into the ranks of anatomists, it was the universal custom to revere the great Galen (130-200 A.D.). Human bodies for purposes of dissection were difficult to procure, and hence much was taken for granted. Vesalius soon learnt to trust his eyes, rather than follow the teachings of the schools, and thus introduced a new spirit into the study of anatomy. The overthrow of authority rapidly followed and to him, more than to any other man, anatomical science owes the re-establishment of the scientific method, thus making further advance possible.

Vesalius demonstrated that the lower jaw in man is a single bone, "that it is not divided as in the dog and other lower mammals, and as Galen had taught, also in the human subjects. He showed that the sternum has three parts instead of eight; that the thigh bones are straight and not curved, as in the dog. Sylvius, his old teacher, was one of his bitterest opponents; he declared that the human body had undergone changes in structure since the time of Galen, and, with the object of defending the ancient anatomist, he asserted that the straight bones were due to the narrow trousers of his contemporaries."

"The theologians also found other points for contention. It was a

widely accepted dogma that man should have one less rib on one side, because from Scriptural account Eve was formed from one of Adam's ribs. This, of course, Vesalius did not find to be the case. It was also generally believed at the time that there was in the body an indestructible resurrection-bone which formed the nucleus of the resurrection-body. Vesalius said that he would leave the question of the existence of such a bone to be decided by the theologians, as it did not appear to him to be an anatomical question."

RESULTS OF THE PREMATURE LOSS OF DECIDUOUS TEETH*

By Henry F. Hoffman, D. D. S., Denver, Colo.

WE OFTEN think wrongly of the deciduous teeth as being a miniature of the permanent set. Barring wear, the permanent teeth are intended to remain practically as originally placed in the arch and to perform only the same function for which intended, namely, mastication.

On the other hand, with the deciduous teeth the function of mastication is almost secondary to the function of determining the shape and size of the permanent arch; while that characteristic of the permanent set, of fixed position of the individual teeth and of the size and shape of the arch, is entirely absent in the deciduous denture of the normal individual.

Fig. 1 shows a normal set of teeth at four years of age. Observe that the teeth are all in lateral contact. Fig. 2 (the models of this case were kindly loaned me by Dr. A. H. Ketcham), shows a normal set of teeth at five and one-half years. The most striking feature present at four years is lacking here; namely, the maintenance of the contact points anterior to the deciduous molars. The teeth are no longer dependent upon each other, but are separating as the arch expands. This is as it should be. Contrast this with Fig. 3 which shows a case at nine years. There are no developmental spaces, eruption is retarded and the teeth are erupting in rotation and lingual to the arch.

We have become so accustomed to admiring the wonderful anatomy of the permanent teeth, and their arrangement in the arch, and to worshiping the contact point, that we often forget that at five and one-half or six years this entirely different condition shown in Fig. 2, is just as much of a normality, just as much a necessity to the future welfare of the teeth and patient as is the maintenance, later in life, of the contact points between the permanent teeth.

And just so necessary as it is to restore the contact points when lost between the permanent teeth, so it is necessary in the deciduous set that the contact points anterior to the first deciduous molars be destroyed, so to speak, at the proper period of development (Fig. 2).

Dr. Bogue in a series of articles entitled "Orthodontia of the Deciduous Teeth", published in the *Dental Digest*, beginning in October, 1913, says that "what is a normal deciduous denture at four years is a serious irregular-

*Read before the Denver Dental Association, March 12, 1914.

ity at five and one-half or six years, being a departure from the normal, sufficient to prevent the permanent teeth from erupting into their correct positions."

A careful study of the forms of the crowns of the various teeth is all that

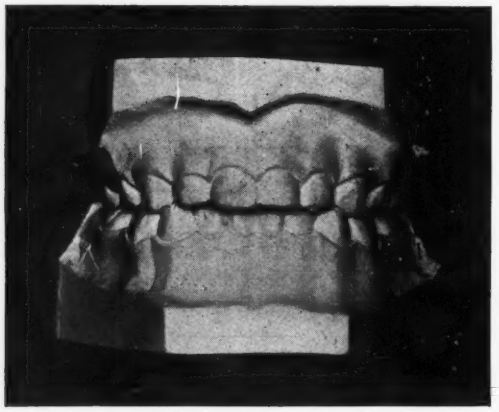

Fig. 1.—Normal deciduous denture at four years.

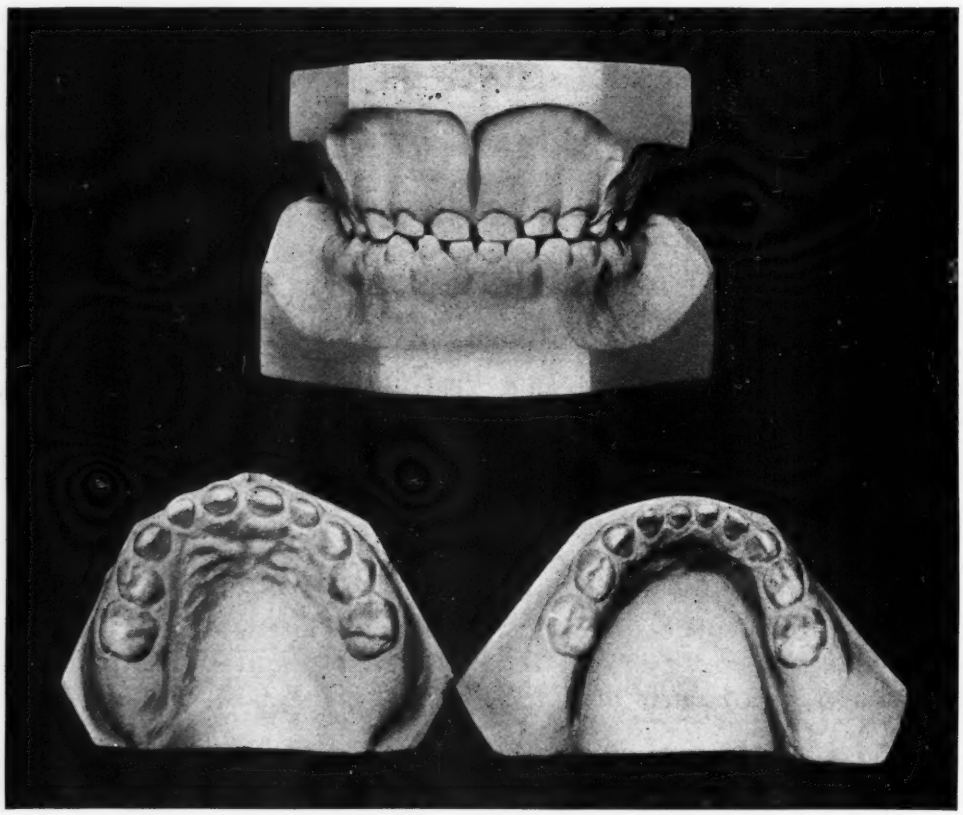

Fig. 2.—Normal deciduous denture at five and a half years (Ketcham).

is necessary to convince one that they can only erupt to proper position in the arch without lateral contact. Consequently nature intended that they should have space to erupt to position in the arch without lateral contact.

We cannot accept another statement of Dr. Bogue that "the deciduous

teeth establish the line along which the permanent teeth erupt," without also admitting the necessity of maintaining the normal deciduous arch until the eruption of the permanent teeth.

This apparent digression from my subject is to show that the size and shape of the deciduous arch, while a fairly definite and determinable factor, is nevertheless one which should vary according to the age and development of the permanent teeth of the individual, in order that in maintaining in the arch the space belonging to a deciduous tooth prematurely lost, we may know what that space should be, and how it should vary at different ages.

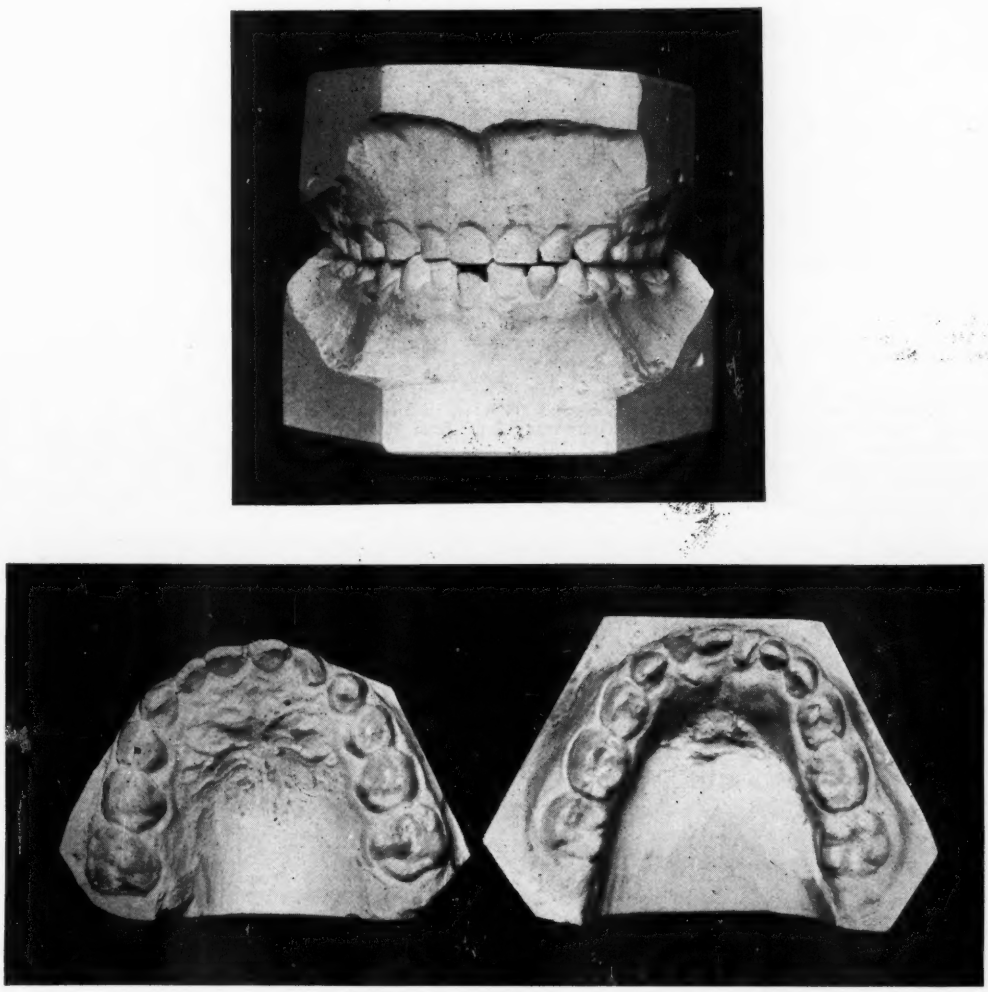

Fig. 3.—Denture at nine years showing retarded development of arches.

Two charts, prepared by Dr. Barnes, and published in an article entitled "Evidence and Significance of Tooth Eruption," in *Items of Interest*, September, 1909, show in Fig. 4 the relative size and positions in the arch of the teeth, at five years in light, and at nine years in dark; and in Fig. 5 the deciduous denture in dark at five and the permanent denture at maturity in light, and also show how the first permanent molars shift forward to complete the contact points during the eruption of the second bicuspids.

The deductions to be drawn from these charts, without going into detail,

are that nature intends that sufficient space shall be provided for the full eruption into position in the arch of all the teeth without lateral contact. Consequently the width development of the arch is complete as far distal as the first deciduous molars at from seven to eight years; and the anterior posterior development from the lateral incisor to distal of second deciduous molar is complete at four or five years.

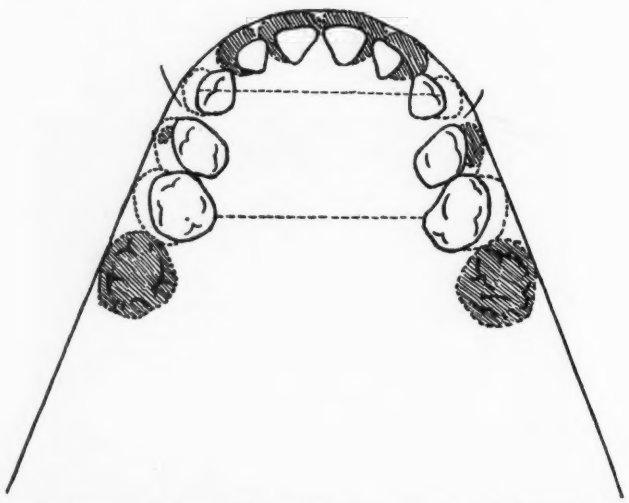

Fig. 4.—Chart showing the relative size and position in the arch of the teeth at five years and at nine years. (After Barnes.) Full outline—Temporary denture at five years. Dotted outline—Developed arch at nine years. Shaded area—Permanent teeth.

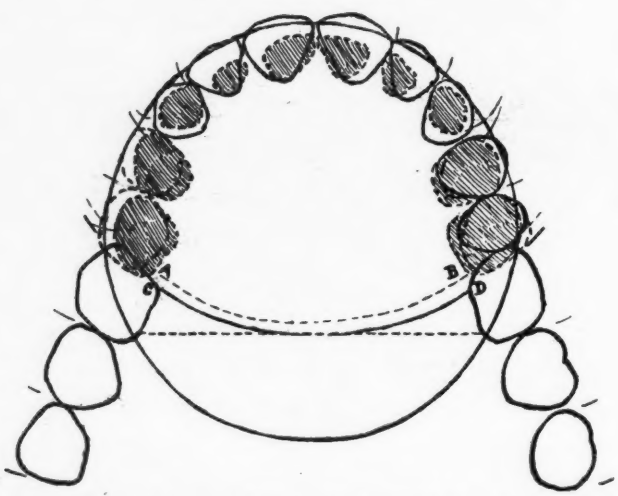

Fig. 5.—Chart showing the relative size and position in the arch of the deciduous denture at five years and at maturity. (After Barnes.) Full outline—Permanent denture at maturity. Shaded area—Deciduous denture at five years. Dotted curved line *A* to *B*—Distal of second bicuspid and mesial of first permanent molars. Black line *C* to *D*—Distal of second temporary molars and formerly mesial of first permanent molars.

The premature loss of deciduous teeth may be considered under three heads:

First, the extraction of persistent deciduous teeth when their permanent successors are congenitally absent. A deciduous tooth remaining persistently in the arch and having no permanent successor should be regarded as a permanent tooth and treated as such.

The upper lateral incisors and the second bicuspids are most often con-

genitally absent, which makes exceptional care necessary before removing these teeth.

Fig. 6 shows a typical case of absence of a second bicuspid. Fig. 7 shows another case in which the second deciduous molar was extracted and the crowns of the first permanent molar and the first bicuspid have tipped. I had a number of humiliating cases in my early practice resulting from having removed these deciduous teeth when their permanent successors were absent. Today, thanks to the X-ray, such an experience is unnecessary if **not** actual malpractice.

Fig. 6.

Fig. 7.

Fig. 6.—Congenital absence of second bicuspid. Deciduous molar still in position. (Radiograph by Dr. A. H. Ketcham.)

Fig. 7.—Congenital absence of second bicuspid. Tipping of first bicuspid and molar due to loss of approximal contact. (Radiograph by Dr. A. H. Ketcham.)

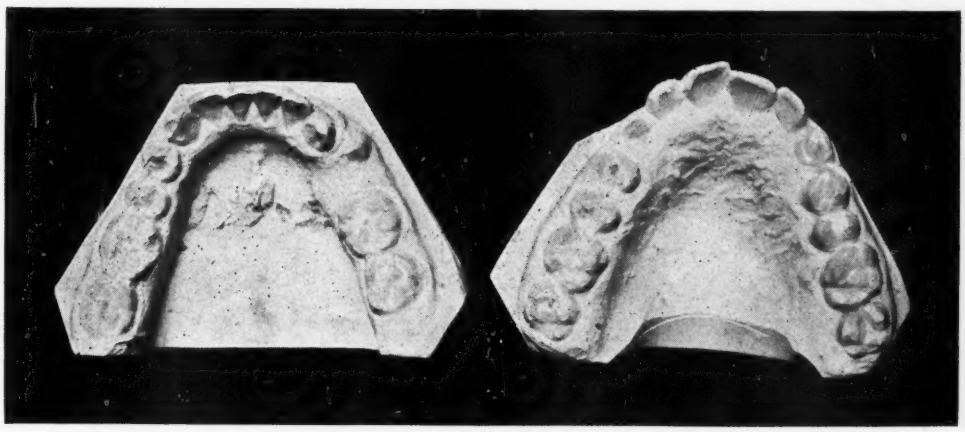

Fig. 8.—Contracted arches and impacted lower right bicuspids due to premature removal of deciduous molar.

An article by Bolk entitled "Supernumerary Teeth in the Molar Region in Man," published in the *Dental Cosmos*, February, 1914, goes into this subject at considerable length.

The second consideration is, the extraction of deciduous teeth before their permanent successors are immediately ready to erupt. It would seem unnecessary to go into this phase of the subject were it not for the repeated examples presenting of such practice.

Fig. 8 shows the result of premature extraction of a deciduous molar, age fourteen. The right lower molars have shifted forward and both arches have become contracted by the premature removal of a lower right deciduous molar, thereby impacting the two bicuspids.

Fig. 9.—Undeveloped arches at thirteen years due largely to premature loss of deciduous molars and cuspids.

This boy was a mouth-breather to a considerable extent, and all efforts to locate the cause had failed. The small amount of expansion necessary

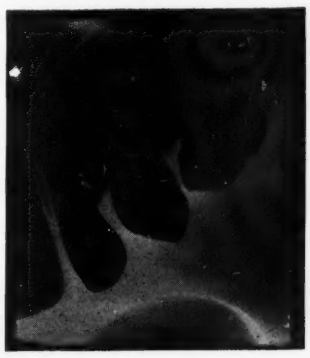

Fig. 10.—Radiograph of Fig. 9 showing impacted upper right cuspid and second bicuspid. (Radiograph by Dr. L. L. Patterson.)

Fig. 11.—Comparative sizes of upper arches at thirteen years in Fig. 9 and normal deciduous arch at five and a half years in Fig. 2.

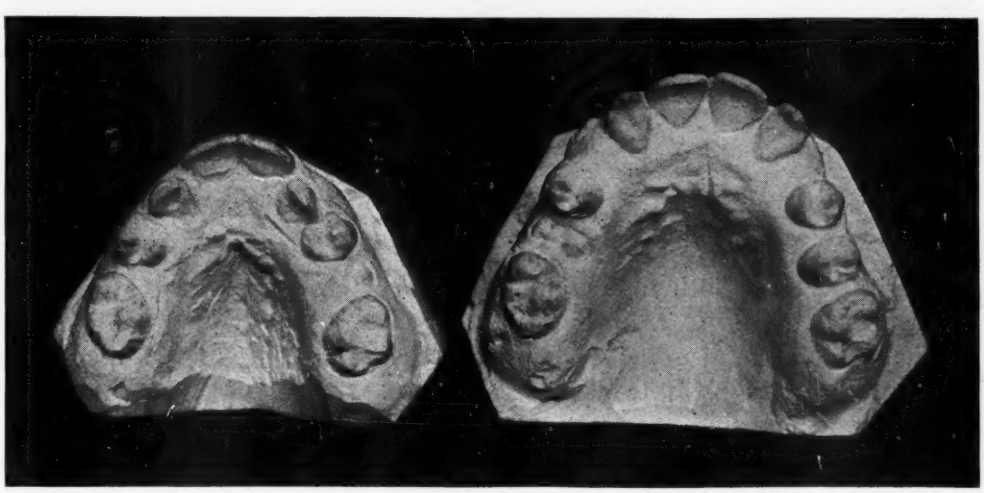

Fig. 12.—Comparative sizes of upper arch in Fig. 9 and same after expansion.

to place the teeth in proper relations corrected the mouth-breathing; improvement being marked only two weeks after treatment was instituted,

which shows that the results of premature loss of deciduous teeth often extend beyond the effect upon the teeth.

Fig. 9 shows another case, age 13, of premature extraction of a deciduous molar coupled with the premature loss of other deciduous teeth by absorption of the roots, and is about as extreme a case as often presents.

The spaces between both the upper and lower first bicuspids and lateral incisors have nearly closed, the upper right first permanent molar has shifted forward, closing the space for the second bicuspid, which is present as shown by the radiograph (Fig. 10). Fig. 11 is a comparative study of the relative sizes of this upper arch at thirteen and the normal deciduous arch at five

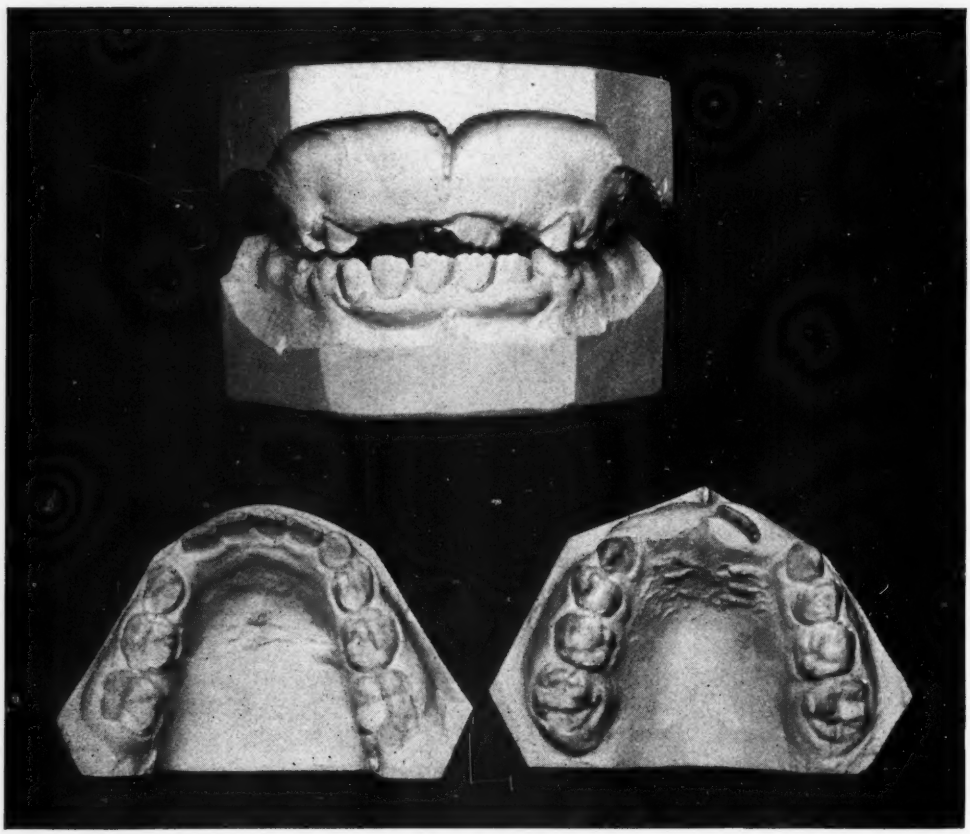

Fig. 13.—Result at six and a half years of loss at six years of lower left cuspid.

and one-half years, both models being photographed together to show the relative sizes.

Fig. 12 shows the upper arch photographed with the same upper arch after expansion sufficient to allow the impacted teeth to erupt. You can see the second bicuspid appearing through the gum.

Needless to say, this boy was a mouth-breather and available information indicates that the cause had its inception in the premature removal of the deciduous molar.

The next and last heading to consider, the loss of the deciduous teeth from premature absorption of the roots, is the one which I wish most to bring to your attention, since it is a cause of trouble more often overlooked,

and the results are quite as disastrous as when the teeth are prematurely extracted.

The natural supposition that the roots of the deciduous teeth are only absorbed upon the immediate approach of their permanent successors is often quite erroneous, as I will attempt to show.

The root of a deciduous tooth may be said to be prematurely absorbed whenever that absorption takes place before the immediate approach of its permanent successor.

The upper deciduous laterals and the upper and lower deciduous cuspids show the greatest tendency toward premature absorption of the roots. The

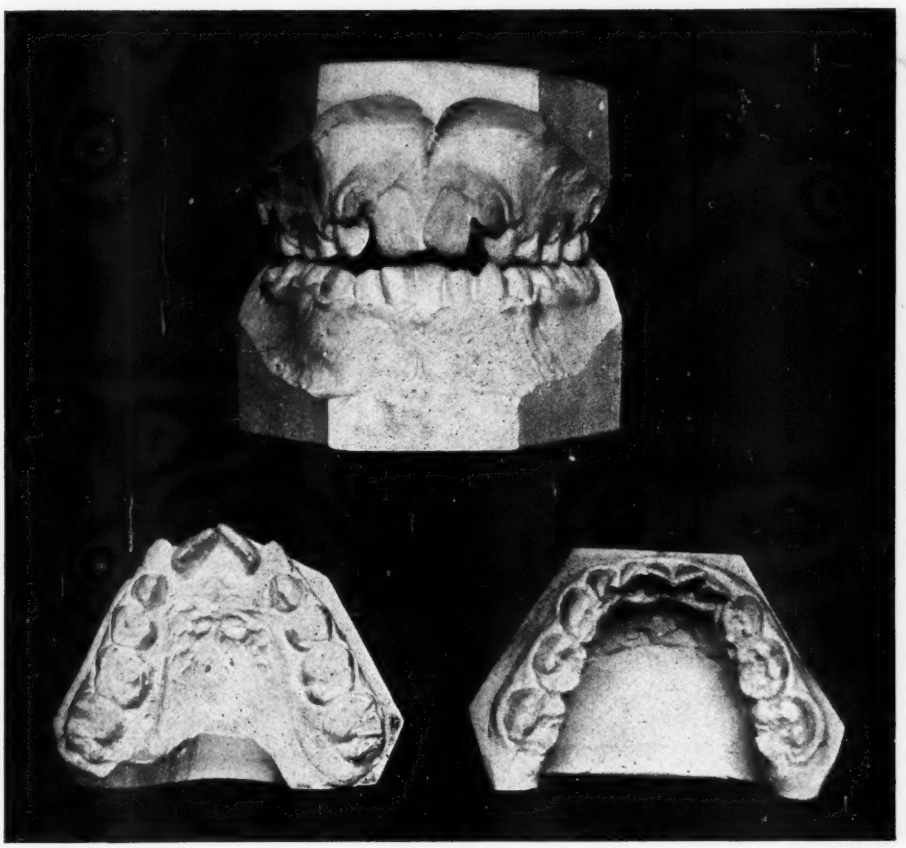

Fig. 14.—Lower left cuspid lost by absorption and space entirely closed at nine and a half years

usual period for the loss of the deciduous cuspids and the eruption of their permanent successors is eleven to thirteen years.

Tables compiled by Drs. W. W. James and A. T. Pitts of London, England, published in the Proceedings of the Pennsylvania State Dental Society, *Dental Cosmos*, January, 1914, based upon 4,850 recorded cases under the age of twelve years, place the eruption of the lower cuspid at ten and one-half and the upper at about eleven and one-half, which is considerably earlier than most of our other tables. That the deciduous cuspids are often lost at a ridiculously early age is now well known.

Fig. 13 shows a well authenticated case which since infancy has been under the constant supervision of Dr. F. S. McKay, to whom I am indebted

for this picture. The lower left cuspid was lost by absorption at six years. The models were made at six and one-half years and show that the lower anterior teeth have already commenced to shift to the left. The other cuspids are now almost ready to be lost.

Fig. 14 is a case nine and one-half years of age, in which the lower right deciduous cuspid has been lost for so long that the space is entirely closed, and the lower anterior teeth have tipped to the right.

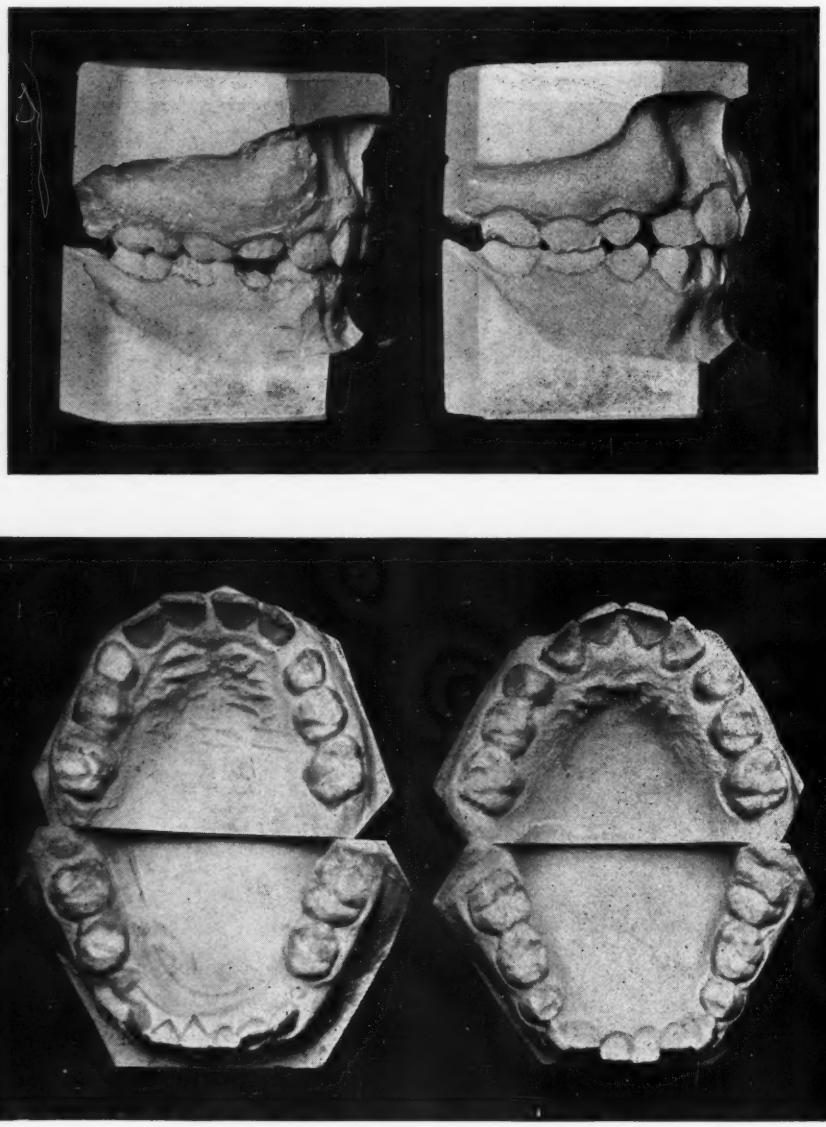

Fig. 15.—Sisters age ten and a half and eleven and a half. Upper deciduous cuspids prematurely lost by absorption. Cuspid spaces closed and occlusion shifted.

Fig. 15 shows the premature loss from absorption of the upper deciduous cuspids in two sisters, age ten and one-half and eleven and one-half. Note that the spaces have been almost entirely closed before the time for the eruption of the permanent cuspids, and also that the occlusion has shifted.

Fig. 16 shows a case nine years of age in which the lower right and upper left deciduous cuspids have been lost by absorption, and the spaces have closed. The front view shows the effect upon the anterior teeth.

In the space allotted me I can only touch upon a few general points without going into particulars. The subject is one which belongs first of all

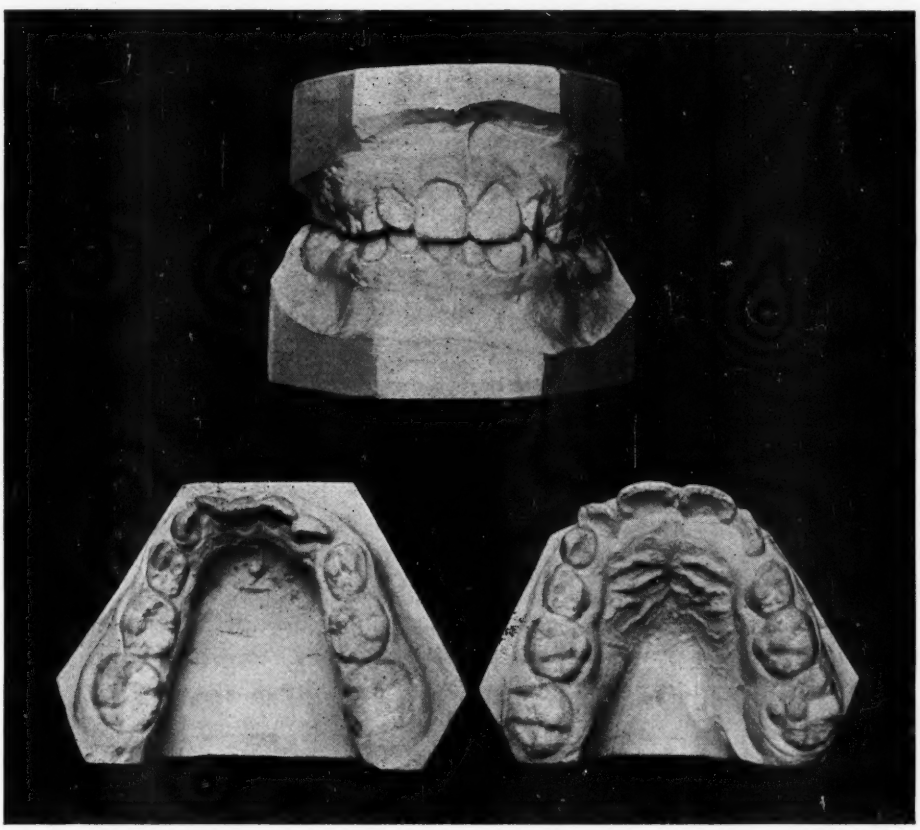

Fig. 16.—Upper left and lower right deciduous cuspids prematurely lost by absorption. Spaces closed at nine years.

to general dentistry, and the truth or falsity of the views taken can best be proven by the profession through the collection and tabulation of the data which comes to you.

I present this to you with the hope that it may encourage greater interest in what is perhaps of the very first importance in preventive dentistry.

DEFORMITIES OF THE FACE AND UPPER AND LOWER JAWS DUE TO NASAL OBSTRUCTION.*

By Mr. Mayo Collier, F. R. C. S., Eng., M. S., London.
Late President of the British Laryngological and Odontological Assn., etc.

MR. PRESIDENT: You were good enough to honor me with an invitation to come here today, and you asked me to place before this distinguished meeting my views on the causes of the very common deformities of the face caused by the upper and lower jaws not coming together. I accepted this invitation with great pleasure, although I am treading on dangerous ground. It is just fourteen years ago since I was bold enough to place some of my views on the subject before the Odontological Association of this country [England] and the least I can say is that my reception then was not a flattering one. I hope I may be more fortunate today. Since then I have observed that most responsible writers on this subject have adopted these views, but the general body of the profession has still to be convinced that the nose has anything at all to do with the trouble.

As I have just observed, and some of you may probably know, I am not a dentist but a general surgeon with a distinct predilection and interest in the affections of the upper respiratory tract, and consequently in whatever obstructs this tract to the passage of the necessary air to the lungs. The mouth naturally would come under observation as frequently as the nose, and it is this association in the examination of both cavities that has given me an advantage that perhaps you may not have had. I can quite understand that unless you are acquainted with the anatomy and physiology of the nose and the marvelous mechanism of respiration, you may think one more or less a lunatic when one begins to talk about negative pressures and positive pressures, and a number of other physical conditions that are part of the ordinary functions of respiration. It is on this account that it may be expected that one who has a knowledge of various conditions of both cavities, the nose and the mouth, is more likely to assist in solving this problem than a knowledge of the mouth alone would permit. That is my excuse for my presence here today. My interest in this subject was first aroused by the discovery of a common condition found in the nose, where the mid-partition or septum is pushed over or deflected to one side or the other. This condition was so common and its presence and causation so bewildering, that it has engaged the attention and exercised the minds of some of the most distinguished men in this country and abroad for centuries. Something like twenty different and indifferent explanations have been offered, illustrating the difficulty of solving this question. I need not trouble you with these, but I need only say that in every case where there is irregularity in the bite or adjustment of the upper and lower jaws, there is always marked deflection of the septum. This cannot be accidental. The association is constant. In the more pronounced conditions of irregular bite there is serious and brutalizing deformity of the face. The face, previously regular and symmetrical, may assume the appearance of an ape or a bull-dog, and

*Read before the European Orthodontic Society, London, 1913.

in other cases assume a most idiotic, fish or parrot-like expression. In the one case the lower jaw protrudes in front of the upper jaw and so gives the face more or less the underhung expression of a bull-dog. In the other type the upper incisor teeth are well in front of the lower, the face is thin, the nose prominent, the mouth is open, and the lower jaw is retracted and small, giving the face a most idiotic and degrading expression. These are the extremes.

You as dentists are called upon to treat and adjust all grades and conditions of irregular bite and teeth with more or less success; but you never succeed in doing away with the shape of the face associated with these irregularities. Are you satisfied to pull out redundant teeth and to push back prominent or irregular incisors? It would, I think, be more satisfactory to find out the causes at work producing these irregularities and, if possible, prevent them.

With the career of a dentist before you, I have presumed that your interest as students in the anatomy and physiology of the upper respiratory tract was not of an ardent nature. Therefore, may I today take the liberty as an old teacher of anatomy of first placing before you a few remarks on this subject, that you may not be able altogether to cull from the text-books. A correct knowledge of the anatomy and physiology of the nose is the one and only key to the proper understanding of the various abnormal conditions found in the mouth and nose, originally one common cavity. It is useless for me to attempt to deal with this subject successfully, unless we all recognize and understand what is meant by the physics of respiration.

The nose, as we surgeons understand it, consists of the external portion extending from the anterior nares to the rima nasi, or narrowest part of the respiratory apparatus opposite the margin of the nasal process of the superior maxillary bone, and of the internal portion—the nasal chambers, extending from the rima nasi to the posterior nares, on a level with the posterior border of the perpendicular plate of the vomer.

The post-nasal space extending from the posterior nares to the lower margin of the soft palate belongs to the pharynx, but is closely associated in its physiology with the nasal chambers, and has opening into it the most important accessory sinus—the tubo-tympanum, or ear cavity. The whole of this space, from the anterior nares to the lower border of the soft palate, is rich with interest and affords a field for many and numberless complaints, requiring for their alleviation a high order of surgical skill, and ability.

Now will you observe with me and note the shape of this, the upper respiratory tract, and we shall be rewarded and surprised to find out something you have not dreamed of before. You note that after passing the rima nasi, the tract expands into the nasal chambers, ostensibly a triangular-shaped box, which, on section, shows a vertical and extensive inner wall, smooth and devoted in equal shares to the olfactory and respiratory functions.

The outer wall slants downward and outward and is devoted to a remarkable arrangement of three horizontal tiers of soft sponge-like bodies, the warming and moistening apparatus of the nose, known as the upper, middle and lower turbinal bodies. The upper two turbinal bodies have a joint function, they are partly respiratory and partly olfactory—the lower one is entirely respiratory. Now, one of the most remarkable facts connected

with the nasal chamber and post-nasal space is this, that extending from its outer wall are six small openings which lead respectively into six chambers of varying capacity, but jointly of such a capacity as to equal the entire cavity of the nasal chambers. We have in front the frontal sinuses; next, the anterior ethnoidal sinuses; then the posterior ethnoidal sinuses; below, the opening of the antrum of Highmore or ostium maxillare. Posteriorly, the sphenoidal opening leading into the sphenoidal sinus, and lastly, the eustachian tube leading into the tubo-tympanum.

Now do you see any similarity between all these singular recesses passing out in all directions and ending in blind cul-de-sacs? Do you see any similarity in each of these to a pulmonary vesicle? I do. They are exactly similar and their function is much the same. Will you note, please, that all the openings are directed away from the inflowing stream of air, and face directly the outflowing stream? Why is this?

There is a constant inflow and outflow of air in each and every one of the cavities with expiration and inspiration. The same takes place in the tubo-tympanum, and it is the cessation of this tide of inflowing and outflowing air in the tympanum that leads so commonly to deafness from negative pressure in the drum cavity, and consequently retraction of the drumhead. The consequences of occlusion of the opening of the other cavities is better known and recognized, leading to empyema, or collections of serous or mucous fluids. Now you will say: How do you know that there is a regular tide of air entering and leaving each and every one of these cavities with expiration and inspiration?

In a healthy living human subject I removed a button of bone in the mid-frontal region, leaving the lining membrane of the frontal sinuses intact. To my surprise, the lining membrane sank down markedly with inspiration and was blown out with expiration. A more direct and absolute proof I could not offer you. This proof is supported strongly by the physiological needs of the part. You are aware that by the law of diffusion there is a constant tendency for the lining membrane of all these cavities to absorb oxygen and give off carbonic acid just as takes place in the ultimate vesicles of the lung.

Just as in the lung vesicle, at each inspiration, a mixing takes place of a little fresher air with the staler air, at inspiration some of the air is drawn out of each cavity by aspiration, and with expiration this is replaced, ensuring a thorough mixing of the good and less good air and the cold and less cold air.

The nasal chambers and their accessory sinuses are then not only resonance chambers to enhance the power and volume of the voice, but they are accessory lungs, and so materially assist in the functions of respiration. Every mammalian, then, has two sets of lungs—he has the head lungs and the chest lungs. This view fits in very charmingly with what is known as the two registers in singing—the head register and the chest register. It is now seen that there is an anatomical basis for this division.

The resonance chamber for the lower notes is the chest, for the higher notes the cavities and sinuses of the head. Let anyone utter a deep bass note continuously for a few seconds and note the effect on the chest and head by placing the flat hand on the surface of each. With low notes the whole chest wall will vibrate quite sensibly and the head not at all. With high

notes th. reverse takes place. The hand can feel the marked vibrations of the head, and the vibrations of the chest are scarcely perceptible. The old Italian masters knew that there was a difference when singing a high or low note, but knew not the reason why. The tubo-tympanic tide may be easily demonstrated by examining the drum head carefully with a speculum and watching the effect of forced inspiration and expiration.

In the act of listening carefully to any sound one is anxious to make out, the attitude is very characteristic. The eyes are shut or turned to some blank surface, the mouth is opened and respiration is suspended after a succession of small inspirations fully expanding the chest.

This attitude insures that the drum shall be at "attention" in the best receptive state, that is to say, tense but not oscillating, and that waves of sound may reach it not only on its outer but inner surface. One or the other side of the head may be directed towards the expectant sound.

By means of the inflow or outflow of the air in each of these cavities, not only is the function of respiration carried on, not only is the air mixed and warmed before it passes on to the lower respiratory tract, but the circulation of the blood and lymph in the lining membrane of the cavities is assisted and promoted. In the tympanic cavity, the constant slight oscillation of the drum and ossicles nullifies the striction of the parts and allows them to be always alert and ready to take up and respond to the smallest vibrations of sound.

We will now pass on to examine further the respiratory tract and return again to the rima nasi. I want you to note that the opening is more or less subovoid, and has for its outer margin the edge of the rigid nasal process of the superior maxillary bone, and on the inside the cartilage of the nasal septum. You will note, too, in connection with this, that the cartilages forming the alæ of the nose are deficient exactly at the margin of this opening. It is here that collapse of the alæ nasi takes place more easily, when from want of use the dilators of the nose are not strong enough to hold open the wings of the nose against the inflowing stream of air. This dimple in the wing of the nose is most commonly observed in persons suffering from nasal obstruction, and in its various grades up to complete collapse of the whole wing of the nose is pathognomonic of nasal obstruction. It is curious to note that the calibre of the respiratory tract is restricted not only so near the external opening, but again becomes so at the posterior nares. Here the calibre is somewhat larger, but still the canal is surrounded by bony and rigid walls.

If you will look at the rest of the respiratory tract, except opposite the cricoid cartilage, you will see that a provision exists for enlarging or lessening the calibre of the lumen according to the needs of the individual. One would have thought that when such an important factor as respiration was concerned, provision would be made for any quantity of air entering to supply any possible needs of the individual. In the human respiratory tract the amount of air that is capable of passing the rima nasi is limited and only sufficient to supply the lung during ordinary quiet respiration. In the lower mammalians the whole of respiration is carried on by the nose. In man, on any increase in the rate of respiration during movements or exercises requiring an increased supply of air, the mouth or accessory respiratory tract is called into use. In the horse and other mammalians capable of great and contin-

uous muscular effort, the mouth is not used as an accessory respiratory tract, the necessary air passing entirely through the nasal chambers. In dogs, curiously, it is not so; the mouth is chiefly responsible for the supply of the necessary air. It is probable that the much developed olfactory function in the dog claims the nose for its special sense, and leaves the mouth when hunting to do the work of respiration.

The capacity, then, of the nose is limited, and the nose, as a respiratory tract, can only be used for quiet or ordinary inspiration. The nasal chamber is more or less an ovoid bag with a narrow opening in front and a less narrow opening behind.

After passing the posterior nares the tract widens out very much into the naso-pharynx and then crosses the alimentary tract in the joint passage, the oro-pharynx (the widest portion of the pharynx), when it again becomes narrower as it arrives at the laryngo-pharynx. So you see, so far, we have found two very narrow rigid constrictions and two dilatations—the nasal chamber with its recesses and the pharynx. After passing the laryngo-pharynx the tract becomes still narrower as it arrives at the larynx, where the organ of voice is situated. Here we find another constriction opposite the vocal cord, known as the rima glottidis. This opening is not rigid or unalterable in calibre, but capable of considerable expansion, as in forced inspiration, and almost complete occlusion as in uttering a very high note.

When spasm of the glottis takes place, it is due to adjustment of the upper or false vocal cords. The ventricular bands are adjusted completely during the acts of coughing and straining, as in defecation and violent muscular action. Immediately following on this variable constriction we come upon another marked narrowing as we pass the cricoid cartilage. This narrowing is smaller than that of the posterior nares, but not so small as the rima nasi. Passing on into the trachea, we find a provision made for altering the calibre of the whole of the rest of the respiratory tract. Rings of cartilage extending more than two-thirds round the tube are acted on by muscles, which have the power to lessen or increase the calibre of the tube, as the case may be. After passing the trachea, we find the tract immensely increased in extent, until by division and subdivision it arrives at the ultimate vesicle of the lung—a minute nasal chamber with its accessory sinuses. Now we will take a general survey of the respiratory tract, and try to interpret the meaning of these various dilatations and contractions. The air entering the nose or mouth does so in obedience to the laws of gravity. When the act of inspiration takes place the chest cavity is enlarged vertically, horizontally, and in all dimensions by muscular effort.

This enlargement of the chest cavity brings about a rarefaction of the air in the lung, which, if not immediately filled up by the inflow of air from without, would prevent further expansion of the chest cavity.

The lung, although not adherent to the chest cavity, follows the movements of its walls from the fact that no air or gas exists between the pleural surfaces. The entry of air between the pleural surfaces would prevent the lung following the movements of the chest wall, and lead to collapse of the elastic lung bag.

Now the entry of air into the upper respiratory tract is not in the nature

of a stream, or forced current of air passing down a passage, and projected into that passage.

The air passes inwards by the process of displacement. Take a tiny ultimate vesicle; when this is expanded in the act of inspiration, no air from without reaches it. The air that passes into the vesicle on expansion is the air contained in the ultimate bronchioles and infundibular passage. There is a general movement of the air in the whole respiratory tract.

The air in the bronchioles passes into the vesicles, the air in the bronchi passes into the bronchioles, and the air in the trachea and pharynx passes into the bronchi; whilst the contents of the nasal chambers move down into the pharynx, larynx and trachea.

There is thus a displacement and mixing backwards and forwards of impure air with more pure air. During expiration the reverse process takes place, so insuring a constant movement and mixing of the whole respiratory contents.

In these few remarks on the anatomy and physiology of the upper respiratory tract, I hope I have made out to you that sufficient interest and importance is attached to this region to be worthy of your consideration. We now approach more the subject-matter of my paper, namely, the cause of certain common deformities of the upper and lower jaws and face, that one may any day observe, during a walk in the crowded streets of any of our big cities in this country or elsewhere.

I more especially allude to three of the commonest types:

1. The bull-dog style of face, with prominent lower jaw and chin, the teeth of the lower jaw, or mandible, being in front of the teeth of the upper jaw, or maxilla. There are various grades or degrees of this, from a slight protrusion of the chin to a deformity in exact accordance with that found in a prize bull-dog. Here the upper jaw is quite atrophic and subserves neither to the purpose of respiration or smell. The teeth of the upper jaw are atrophic and undeveloped, and altogether the curve of the maxillary arch is inside the curve of the mandibular arch.

The second common deformity of the face and jaw is to some extent the converse of this, and is known as the parrot face. Here the incisor teeth of the upper jaw are in front of those of the lower jaw. The nose is thin and prominent, and the sides of the maxilla are approximated so that the turbinal bodies touch the septum on each side. The molars of the upper jaw are inside those of the lower jaw. The palate is V-shaped.

Then there is a third common deformity which may be associated with either the bull-dog or parrot face, or may affect a face where the upper and lower jaws are quite normal. That is, asymmetry of the external nose; or in other words, the nose is not in the mid-line but deflected to one or the other side in various degrees. Now you will agree with me that none of these deformities improve the esthetic appearance of the face, but in many cases obliterate all traces of the divine character that has been attributed by poets to the human face. That few children are ever born with a marked bull-dog or parrot face, or with a nose on one side of the face, is certain. And what is still more certain is this fact: that a child may be born with a beautiful symmetrical face, with regular alveolar arch and with a nose in due proportion to and in the mid-line of the face, who in after-life may be the subject of one

or other of these marked deformities. I know of many and almost countless instances.

We have arrived at an interesting point of our story. What is the cause of this change for the worse in the symmetry and appearance of the human face in these cases? Can anything be done to prevent or anticipate this change? Can anything be done to alter the deformity when it has already taken place? Is this condition hereditary? I will try and answer all and every one of these questions, and prove to you that these cases are not hereditary, except in the sense that the tendency to catarrhal conditions of the nose and consequent nasal obstruction is hereditary. Various explanations have been given of these irregular and unsymmetrical conditions of the jaw, teeth and palate, but none is altogether complete, clear or satisfactory.

The explanation that I offer you answers each and every one of these tests. It is complete, clear and to my mind eminently satisfactory. I wish to show you that in impeded nasal respiration from catarrh, traumatism or collapse of the wings of the nose, or what not; there is a difference of pressure on the inside and the outside of the nasal box or walls of the upper jaw, which is the same thing, and that if this is so, this difference in pressure, however small, is capable in the young and growing skull of altering and affecting the curves of the upper jaw and the shape of the face and palate.

During inspiration, if the air cannot pass through the nasal chambers it must pass through the mouth, and in doing so abstracts part of the contents of the nasal chambers, lessening the tension of the air in these chambers and exposing all the walls of the nasal box to a slight increase of pressure from without. You know the old saying: "The constant falling of a drop of water will wear away the hardest stone."

So in these cases, the slight extra pressure to which the outer walls of the nasal box are exposed some twenty thousand times a day exerts a squeezing effect; which in time pushes up the lower wall of the nasal box or palate and approximates the outer walls, so squeezing the alveolar arches together, approximating the turbinal bodies to the septum and throwing forward the front portion of the alveolar arch, and with it the incisor teeth.

It depends on the degree of the nasal obstruction and the age of the patient, whether the whole upper jaw shall suffer and become undeveloped and so necessitate almost complete oral respiration as in the bull-dog type, or whether the incisors of the maxilla shall overlap the incisors of the mandible, as in the parrot type of the face. In both cases the upper jaw suffers severely; but in the bull-dog type, the lower jaw is well developed and thrusts forwards, whereas in the parrot type the lower jaw is retracted and smaller than normal.

Some of you may ask what evidence is there that there actually is a difference of pressure on the inside and outside of the nasal box during impeded nasal respiration. I cannot do better than quote to you some remarks I made on this subject before the Odontological Society of London in 1899:

"You ask what evidence is there that the stream of air on its passage to the lungs abstracts part of the contents of the nasal chambers and so causes a lessened tension of the air contents? Some have stoutly denied this fact and attributed the very idea to a flight of the imagination of the enthusiastic

writer. The same individuals are in the habit of using sprays—no doubt, constantly—in the treatment of their patients and must be quite unaware that the law that regulates the spray is the same law that regulates the condition of the air contents of the nasal chambers. Any stream of air passing, however slowly and softly, over any opening leading into any chamber, whose contents are air or gas, abstracts part of the contents and consequently lessens the tension of that gas or air. This law of pneumatics applies to atoms in a state of mobility. The actual proof that the tension of the air in the nasal chambers is lessened during each oral inspiration can easily be obtained and should be a complete answer to any objection to the accuracy of this contention. If a manometer be connected with the nose and fit accurately, during each oral inspiration the mercury will ascend in the proximal limb. A more absolute proof cannot be offered. One can also actually see the effect of the difference in tension of the air contents by observing the interior of the nose through a Siegel's aspirator. On inspiration the mucous membrane becomes redder and on expiration paler, due to the decreased or increased extra-vascular pressure. I do not fear that with the support afforded by this evidence anyone can seriously contend that complete or partial obstruction to nasal respiration is not followed by oral respiration and as an indirect result by lessened air tension of the contents of the nasal chamber."

Now we will approach this subject from an experimental point of view, and I can tell you that if healthy young animals be taken and the nasal opening obstructed, all and every one of these alterations can be manufactured at will—nay, more, the whole face and head can be profoundly altered in size and shape. I will quote to you from Professor Ziem, of Dantzig, whose investigations on this subject are worth the fullest consideration. The experiments of Professor Ziem, although instituted and carried out for a totally different purpose, are completely in support of my contentions. He has proved by direct experiment on animals that every obstruction to the nose when acting for some considerable time, exerts widely spread consequences on the development of the skull in young animals in which the nostrils (one or both) are completely blocked up for a long time. Not only the upper jaw but the whole of the frontal bone was affected. There was seen a deviation of the intermaxillary bone and the sagittal suture towards the shut-up side; also a lesser length of the nasal bone, of the frontal bone, and of the horizontal plate of the palate bone. The palate bone, as compared with the other side, was distinctly atrophied. The nasal bone and the frontal bone were atrophied and the sutures were displaced from the mid-line towards the atrophied side. There was less steep elevation of the alveolar processes. There was a smaller distance between the anterior surface of the bony auditory capsule and the alveolar processes, also between the zygomatic arch and the supraorbital border, and the smaller size and asymmetrical position of the vascular and nerve canals on the closed side of the nose. The distance of the two orbits from the mid-line was unequal, which, as has been observed in men, leads to asthenopia, astigmatism and strabismus. The orbit itself was smaller on the closed-up side and the frontal bone, the ear, and the whole side of the face were arrested in their development.

The cause of the minor deformity of asymmetry of the nose is quite

simple and easy to understand, and can often be quite easily rectified. You are aware that the septum of the nose is thin, composed mostly of very thin cartilage and bone, and is quite movable and easily displaced. Under normal circumstances, the septum occupies a central position and an equal quantity of air enters each nostril, and so the pressure on each side of the septum is equal. If from any cause more air enters for a length of time one nostril; more pressure is exerted on that side of the septum, and being easily displaced, it is curved and pushed toward the shut-up side, so that the tip of the nose is deflected towards the open side. Ultimately, the closed side becomes more closed and the open side more open, and the whole nose becomes pushed over towards the shut-up side.

The remedy for these cases is quite simple. Open up the closed side, support the collapsed wing, equalize the amount of air passing each nostril, and the nose will right itself and quickly assume a central position. The remedial measures to be adopted in the other deformities are quite as simple, and I have found the use of plates to expand the jaw quite unnecessary, and in many cases quite harmful. If the deformity is not too marked and the age of the patient is below where complete ossification has taken place, much improvement in the size, shape and symmetry of the upper jaw can be effected by simply restoring the normal calibre of the nasal passages.

In a multitude of cases of marked deformity, this has been arrested by restoring the full measure of nasal breathing, and much improvement has subsequently taken place in the size, shape and symmetry of the upper jaw and face.

My chief object in making these remarks to you today on the maxillary and facial deformities is to stimulate your interest and study of the same, from a purely etiological point of view.

I have endeavored to point out also to you, that it is not only possible but easy to predict the course of such cases, and to adopt effective measures for their prevention. For more especially in these cases is prevention better than cure.

DISCUSSION.

Prof. A. Chiavaro, in opening the discussion, said he had been much interested in what the two essayists (Daniel M'Kenzie* and Mayo Collier) had said, and he considered the positive and negative pressure must have some definite relation with deformities of the teeth. The papers were of such a character that they should be read and studied carefully before any one could speak very positively on the question. He thought there should be some cooperation between the orthodontist and the rhinologist in dealing with many cases that arose; in all the deformities of the nose the rhinologist should call upon the orthodontist to deal with the teeth. In attempting to regulate teeth it was important to look at the other forces bearing upon the occlusion. He had known of patients who had had surgical operations of the jaw and been taught to keep the mouth closed, and had noticed that the teeth had not moved at all, and it was a well-known fact that anyone could talk with the teeth quite closed. The new idea put forward as to negative and positive pressure affecting the teeth, opened up a wide field for study, and probably in that connection much might be learned from experiments on monkeys.

Dr. J. Sim. Wallace said Dr. M'Kenzie had said so very much with which he most heartily agreed that he had very little to say about that paper. Mr. Mayo Collier had

*Dr. M'Kenzie's paper on "Some Points of Common Interest to the Rhinologist and the Orthodontist", published in the January issue of the International Journal of Orthodontia, and the above paper by Dr. Collier, were discussed together.

said so much with which he disagreed, that he felt he could not say very much about the paper either. Mr. Mayo Collier appeared to think that the lower jaw was never affected, a statement that was almost sufficient to take away the breath of an orthodontist, because it was well known that the lower jaw was affected very often. If Mr. Mayo Collier had seen many cases where the lower jaw was not more or less affected it was quite contrary to the experience of many dentists. As a matter of fact, at a very early period the lower jaw did become affected and got into what was called in Great Britain "post-normal occlusion", or according to Angle, "distal occlusion", and it was a very marked characteristic of mouth-breathing. With regard to Professor Ziem's experiments, it seemed to him that the experiments showed one thing and Mr. Mayo Collier inferred that they showed something else. Ziem interfered with the function of respiration through the nose, and it was well known that interference of function often prevented the development of a particular part. That the nose did not develop well when its function was interfered with he had no doubt, but there was not the slightest evidence to show that it was a question of positive or negative pressure. There was simply the lack of function, the lack of stimulation. There were two cases brought forward not long ago by Mr. Turner at the British Society for the Study of Orthodontics, in one of which the tract had been opened very early in life on account of some more or less complete blockage above, and the child had gone on breathing through the tracheotomy tube for some eight or ten years. There was no necessity for the mouth to be held open in order that the child should breathe; there was no function of the nose; there was no positive or negative pressure; yet the child showed remarkably excellent sets of teeth. There was some experimental evidence which members of the Society were more or less familiar with, evidence which was put forward by Dr. Laurence Baker, with regard to mastication in rabbits. The teeth of the rabbits were filed down on one side so that the animals could not masticate on that side, and a remarkable effect was produced; not only were the jaws not so well developed but the bones right up to the base of the skull were not well developed.

With regard to Dr. M'Kenzie's paper, Dr. Wallace did not wish to criticize it adversely at all because he felt very much in agreement with what Dr. M'Kenzie had said, but there were one or two points in which the paper might be supplemented. He did not know whether Dr. M'Kenzie was aware of the extremely early time at which post-normal occlusion or distal occlusion asserted itself. Once the temporary molar teeth were in occlusion, if they were post-normal at the age of eighteen months or two years, it was extremely improbable that they would ever change without mechanical interference. To go back still further, if at the time of the eruption of the incisor teeth, the lower incisors bite too far back, i.e., instead of biting a third of the way under the upper incisors they bite right on the gum, in all probability that would be followed by post-normal occlusion. With regard to the importance of mastication at the time of the eruption of the central incisors, there was practically no possibility of mastication because there were no molar teeth. There was the possibility of gnawing, and at that age a child was particularly anxious to gnaw anything it could get; in fact, that was a wise provision of Nature for getting the earliest possible opportunity for correct occlusion. If the lower jaw was voluntarily or semi-involuntarily held forward in such a position that the child obtained the maximum advantage from chewing, there was a tendency for that position to be established. At an early age the jaw was in all probability specially adapted for growing rapidly and taking up exactly the position which it ought to take with regard to the upper teeth. If the lower incisor teeth did not occlude normally with the upper incisor teeth, the case would be one of post-normal occlusion. That emphasized Dr. M'Kenzie's point with regard to the importance of mastication. A point that Dr. M'Kenzie was not absolutely correct upon was with regard to the tongue. He said it was essentially passive. As a matter of fact, if measurements were taken of the width of the temporary molar teeth of a child at the age of three, and every year onwards, it would be found that they were gradually pressed outwards, and Dr. Grevers had measured it as about six millimetres spread. In the case of his own children he had several models. He had a model of the mouth of his boy at the age of three and a half, and at the age of twelve the same teeth on being measured showed a difference of about five millimetres in breadth; so that without the pressure or development outwards of something, whether the tongue or nor, there could not be the outward translation of the teeth. As the tongue was the only mechanical factor he could think of he presumed it was the tongue, more especially having regard to the fact that when the tongue was

not operating, i.e., when the mouth was held open, the outwards translation of the teeth did not take place. In fact, it was possible to have a crowded arch where the teeth had remained in the same position as they were in early life. One of the commonest conditions seen in the mouth where the teeth were not used on one side was that the teeth on the unused side were dirty and in more or less a septic condition. That was very well shown in the case of pap feeding; where children were fed on soft food the upper and lower teeth on both sides were in a filthy state. There was as a result general emaciation of the child, because when the mouth was in an unhealthy state it communicated its effects beyond the teeth. If the child was emaciated, why should it be assumed that the tongue was not equally emaciated? He had seen two children recently, one with a particularly narrow tongue and the other with a particularly broad tongue. The children were brother and sister and the parents thought it very remarkable that the girl should have so long a tongue and her brother such a wide tongue, but they had not correlated the breadth of the arch and the breadth of the tongue. The lack of development of the tongue was an additional factor in the causation of the general broadening of the arch.

Dr. E. D. Barrows said that in nearly all cases where the bite was corrected, it was necessary to widen the lower jaw as well as the upper, and he thought it would be an exception to find the lower jaw of the proper width. He considered there were irregularities which were hereditary, and he had noticed in many families, where the children had the centrals spaced apart, that such a condition also occurred either in the mother or in the father and extended pretty much throughout the whole of the children.

Dr. Hans Hecht said that when a child was born it breathed before it masticated and the breathing had certainly a great influence on the development of the jaw, which is the causative factor of irregular positions of the teeth. For instance, very often we find all the temporary teeth arranged in a perfect arch and with their masticating powers equally perfect. Yet at the time of the appearance of the permanent teeth the jaws show, in spite of the perfect masticating powers of the temporary set, a decidedly insufficient development and enlargement for the normal arrangement of the permanent teeth. He thought more of the irregularities found in the lower jaw were really produced by abnormalities in the upper jaw. If, for instance, the nasal and maxillary sinuses were not well developed, it should not be expected there would be very great width at the temples, and the lower jaw would not extend to its normal size. On the other hand, the articulation of a contracted upper influenced the lower arch through mastication. He did not see that the tongue was at all responsible for it, because he had often seen a large tongue with quite a small lower arch. He thought the growth of the lower arch was dependent on the width of the fossae mandibularis of the temporal bone from one side to the other, and also on mastication. In Class II, Division 1, the upper jaw was often found abnormal and the lower jaw perfectly normal. After reconstruction the normal arch of the upper jaw is in harmony with the normal form of the lower jaw, and it is found in applying the expansion arch that there was very little to regulate and that regulation could be done without any great complications.

Dr. A. C. Lockett thought the Society was very fortunate indeed in having had two such excellent papers from such eminent men. Ever since he had taken up the question of the treatment of irregularities, he had always been impressed with the fact that the bulk of the work of orthodontists arose in connection with the physiology and anatomy of the nose and throat. From time to time he had studied the causes of dental deformities and had often considered he had found a solution. For instance, when the subject of mastication was pointed out to him, he had concluded that was a very feasible solution, and the more he thought of it the more reasonable it seemed. At the same time he came across cases where it was difficult to see that the lack of mastication was a factor in the irregularity. Then there was also the question of the tongue. He had come across cases in practice where the action of the tongue seemed to a certain extent to have been the cause of the irregularity and the narrowness of the lower jaw, but when he had made up his mind that it was an established fact, he would get another patient with muscular action of the tongue so very strong that it was hardly possible to get a finger into the mouth. He had had two cases of that description, where the lower jaw was very narrow and the teeth were tipping inwards, and the tongue exceedingly strong. He agreed with Dr. M'Kenzie in many respects,

and felt positive that both he and Dr. Sim. Wallace were correct, but that they did not explain all the difficulties with which orthodontists come in contact. With regard to the question of negative and positive pressure, it was a particularly interesting theory inasmuch as it solved some of the difficulties in cases which were not entirely due to the lack of mastication, or to the tongue, or to the ordinary muscular contraction of the facial muscles in pushing the tongue forward and narrowing the upper arch. With regard to the undeveloped lower jaw in cases of protrusion of the upper jaw, he was rather inclined to think that, although there was a certain amount of truth in the statement that Mr. Mayo Collier brought forward, there were cases where the theory could not be accepted. He agreed with Dr. Hecht that in a good many of the cases of marked protrusion and narrowing of the upper jaw there was not an abnormally developed lower jaw as far as width and the relationship of the teeth was concerned. There was certainly an elevated condition of the lower incisors with the dipping down or marked lower standing (infra-occlusion) position of the bicuspids. The question of the development of the lower jaw was not in the width of the jaw but in the lack of its antero-posterior position.

Dr. G. D. de Vries considered it was a misnomer to speak of protrusion of the upper jaw, as Dr. Lockett had done. In dealing with Class II cases, he had come to the conclusion that the difficulty was more often in the relation of the lower jaw to the upper; there was not a direct protrusion of the upper jaw but a retrusion of the lower. From the measurements he had made and his study of the subject he thought the change had taken p'ace in the angle of the jaw. That was a theory Dr. Law had promulgated, and he thought when people spoke of the protusion of the upper jaw they really meant retrusion of the lower jaw, and when dentists extracted the upper bicuspids, they pushed back the upper six anterior teeth and in that way mutilated the case. With regard to the position of the upper first molar in relation to the lower ones, when a case of Class II was corrected the lower teeth were brought forward by a force working on the angle of the jaw. He should like to know what conclusions the members had arrived at when they said that they corrected a case of Class II by not extracting any of the upper teeth.

Dr. Van den Berg mentioned a case in which all possibility of pressure was excluded and there was an expansion of a few millimetres in the arch.

The President said that with regard to negative pressure, the experiments made by the late Prof. Donders, of Utrecht, appeared to be conclusive. The Professor put a manometer between the tongue and the palate, took the reading when the subject was swallowing and found that there was a negative pressure. In that connection the members would remember that as boys they had small leather discs which acted as suckers. The disc of leather, when wetted and pressed against a smooth surface, was very difficult to lift and there was certainly a negative pressure there. It showed that the outer atmospheric pressure was stronger than the pressure between the leather and the material to which it was attached, and he thought the same thing would apply to the pressure between the tongue and the palate. Therefore he had to maintain the point he had already raised.

Dr. K. A. Davenport thanked the essayists for their papers and said he felt a great deal had been lost by having to discuss them together, because to him they were as different as night and day and it was difficult to talk about them together. With time to read the papers it might be possible to discuss a good many points, but it was impossible to discuss such papers after simply hearing them read for the first time. One point Mr. Mayo Collier had brought forward he should like to allude to. It was surprising to hear Mr. Mayo Collier's remarks referring to heredity. He himself thought that heredity counted in such cases as much as it counted in any other feature of the face; and he should like to ask Mr. Mayo Collier how he explained the characteristics of the bull-dog if they had not been brought about through breeding. Also did Mr. Mayo Collier think it possible that mating the greyhound with the bull-dog would have no effect on the progeny. There was no reference in Mr. Collier's paper to the lower jaw and all his work referred to protrusions and narrowing of the upper arch. Dentists had recognized years ago that the superior protrusion cases, so-called, were not superior protrusion cases; in fact, there was the greatest difficulty in many cases to get sufficient protrusion so that the lower jaw could be put in its proper relationship.

Dr. M' Kenzie, in reply, thanked the members for listening so patiently and carefully to what was obviously a very amateur performance on his part. The coolness with which a man who was an amateur in such matters came and addressed an audience of professionals was not refreshing. He was particularly thankful to Dr. Sim. Wallace for one or two points he had brought out, which were indeed absolutely unknown to him. With regard to what the President had said as to the experiment with the manometer in connection with swallowing, it was always a very dangerous thing to question the results of any experiment, but he was very doubtful on the point put forward. He could not for a moment imagine how a manometer placed between the tongue and palate would register negative pressure. It would be pressed against the tongue and palate and would show positive pressure, and unless the experimen was repeated several times he should be extremely doubtful of the observation. He did not think he should lay much stress on the fact of the manometer pressure varying as bearing on the influence of the tongue in the expansion of the palate. One speaker had referred to the fact that all the difficulties which he met with in practice were not solved by the theory of mastication, with the aid of the pressure of the soft parts and the pr ssure of the tongue. It was, of course, always a difficult matter to apply theories in such a way as to explain every individual case that came forward, because there were many items which entered into the formation of the case which were extremely difficult afterwards to explain. At the same time he fancied from what he had read, and on thinking over matters, that opinion in general was actually broadening in regard to the part which mastication played. There might still be an occasional hankering after the old-fashioned theories, and occasionally men might be delighted by listening to such remote and almost antiquarian productions, as those which had to do with negative and positive pressure (Laughter), but when they came to modern work and modern views he thought most men would undoubtedly come to the opinion that it was mastication primarily, if not wholly, that gave the clue to the development of the facial lines. There could be no doubt about the rightfulness of bringing the deformities of the jaw into line with what was known to occur elsewhere in the body. If anything else was done it was claiming for the bones of the jaw something which ould not be claimed for any other bone in the body, and it was therefore a bone *sui generis* and that was a position very difficult to advocate. When there was a theory which fell into line with the theories applying elsewhere to the constitution of the body, he thought that factor was a very important factor in establishing the truth of the theory. It was a long time since he first heard Mr. Mayo Collier's theories and he much admired them. He remembered hearing Mr. Mayo Collier a good many years ago say that the anterior turbinals by swelling fitted into, and he presumed caused, nests in the septum, which formed cradles for their reception. He was sorry to say he had never seen those nests. For a long time he spent a good deal of energy in searching for them, because the observation was made by Mr. Collier with so much emphasis, that he began to get into a little trepidation in daring to differ on a point which was stated so strongly. He was bound, however, to say that he had not seen those nests as yet, and consequently he felt himself in conflict with Mr. Mayo Collier, not only with regard to the theory he put forward, but also with regard to the actual definite observations. Therefore, he felt it rather difficult to go into theory which was based upon observations which he had not been able to substantiate.

Mr. Mayo Collier said it was within his power to give people facts but he could not give them the intelligence to understand the facts (Laughter). He was glad the President had also come under the castigation of Dr. M'Kenzie without feeling much the worse for it (Laughter). He had to congratulate himself that Dr. Davenport, a distinguished gentleman, had let him off so lightly in his criticism of what he really did not say, because he did not say that the hereditary tendency had nothing to do with the deformities of the upper jaw; what he said was that he was glad to hear that in an enormous number of cases the child was born with a perfectly symmetrical and normal upper jaw and that the distortion and irregularities supervened. As a matter of fact he was particular to say that there was an hereditary factor in the case, namely, the hereditary tendency which produced the trouble. There was a tendency, for instance, in the father to catarrhs and there was a tendency in the tissues and in the development. He agreed that the deformities were to a large extent due to the lack of stimulation, and he agreed with Dr. M'Kenzie that a bone which was not used did not grow. Growth requires use. With regard to Dr. Sim. Wallace

being surprised at his emphatic statement on the subject of the lower jaw, he might say that when the lower jaw was not used, when the mouth was open and the lower jaw was retracted, the angle altered and of course the width of the arch was less than it should be. That followed without any argument at all. Dr. Hecht had thought there was something in it, and if he got one out of fifty to believe it he was perfectly content. If the members would be good enough to read his exposition of the facts of the case he thought they would not disagree that there was a factor of negative pressure. He only wanted the fact to be recognized that there was the negative pressure. He did not say it was capable of all that he had said it might do, and if there were other factors capable of doing the work he was quite prepared to say he was wrong. He was convinced that the negative pressure could do what was ascribed to it, and in the picture he had shown on the screen the whole of the distortion of the face, especially of the upper jaw, was done by the forces he had shown to exist. How far other factors produced deformities he did not know, but he claimed that the factor he had put forward was the principal one. He could not see how the force of the tongue on the jaw could alter the position of the turbinal bones and destroy the whole of the position of the upper jaw. The lower jaw was but slightly altered compared with the tremendous alteration to the upper jaw, and in fact the lower jaw was so small that he could not see how it was a factor in producing the distortion it was supposed to produce. No doubt it played a small part; everything played a small part. When the nose ceased to be used as the organ of respiration everything went wrong, the whole thing atrophied, and of course the lower jaw atrophied. The lower jaw was meant to rub against the upper one, and if there was no upper jaw to rub against naturally the lower jaw became smaller.

HABIT.

By A. LeRoy Johnson, D. D. S., Springfield, Mass.

THE METHOD of modern science, when endeavoring to determine the nature of a thing, is to render a detailed description of its development; in answer to an inquiry what a thing is, we are met with an account of how it evolved. The object of our particular interest in orthodontia is malocclusion of the teeth with consequential maxillary deformity. And if we are to build a science that will complete its page in the annals of life-history, we must study and record all of the details in the development of this abnormity.

In our literature we read a great deal about the influence of pernicious habits upon maxillary development, a little about the treatment of these habits, and practically nothing about the normal manifestation of habit in the life-history of the organism. And when we remember the general accepted fact, that an intelligent understanding of pathological processes depends upon a knowledge of normal conditions, we cannot fail to realize our position. If we are to solve the problems presented by this phase of our work, we must get down to a study of the normal expression of it; then we shall have a basis to work upon, and from such a foundation will evolve scientific methods of treating its abnormal expressions. It is in appreciation of these facts, together with a belief in the vital influence which habit has upon our work, that I have essayed to present an elementary study of it. While the subject-matter of this paper is essentially that of the one which I read before the Eastern Association of Angle Alumnæ at its annual meeting at New York City, April, 1913, I have endeavored to extend its scope, and in doing so, bring the material more directly to our special field of work.

When investigating any phase of human experience, recourse is first had to the mass of accumulated knowledge. As the facts of life are observed they are classified, systemized, and formulated with reference to the discovery of general laws or truths. These classifications are called sciences, but, though designated by different names, they are not essentially distinct. How can it be otherwise?—Since the units of an organism, though functioning more or less separately, are equally essential to the life of the whole, the ultimate analysis of the phenomena pertaining to the life-history of the organism must result in but one great classification of knowledge.

Despite our logic, since the present day schemes of analysis cannot explain away the facts of life, we classify our observations and from comparative study of these classifications a conception of the whole is evolved. So it must be from a study of many sciences, or at least of the more fundamental laws upon which they are built, that we arrive at anything like a just appreciation of the value of our own.

The study of habit involves a consideration of both physical and psychical phenomena, as expressed in the general sciences of biology and psychology.

Biology, in its broadest sense, is the science of the physical life of the organism, and at the present time implies a knowledge of molecular physics and chemistry.

Psychology is the science of the mental life or consciousness, and bears the same relation to the mind as biology to the body. It attempts to treat the mind analytically, to resolve it into its ultimate factors, and to observe the transition from the simple to the complex. Mental life is individual. As expressed by Royce, "Physical facts are public property, while psychical facts are private property. All may observe the same outward physical facts, while but one can be informed of his own mental state." If it were possible to interpret psychical processes as modes of action or of physical energy, all would fall within the domain of biology. But such is not the case. How, then, since mental life is individual, and since its processes are subjective, can there be a science of it? It is a science owing to the fact that all mental activities have physical expressions, that all psychical processes are accompanied by an interchange of physical forces, and that much of our mental life depends upon more or less definable physical conditions. The science of psychology, then, is the result of study of the physical concomitants to mental activity. It is "symbolic verity." How else can a mind know itself?

In psychology there are two methods of study, one subjective or introspective, the other scientific, observing what exists in nature as contrasted with that which exists merely in the thought of the individual. The first applies more especially to the older general psychology. It consists in the psychologist's determining general laws of the mind by comparing his own mental states with those of other adult human beings. The scientific method is purely objective, and is, in consequence, undoubtedly of greater value. It is the method of experimental and genetic psychology. The former is the most recent branch of psychological investigation, and is carried on in laboratories by means of instruments which seek to determine the physical conditions of mental processes. The latter begins with a study of structure

and behavior as a basis for inference regarding possible mental states. However, it is to physiological psychology, which combines both methods of study, that one turns most frequently in the investigation of habit. It is "the science of the human mind investigated by means of its relations to the physical organism." In consequence of its purpose, the subject-matter of this science furnishes a most valuable source of information. In fact, to gain such a conception of the sciences of biology and psychology in general, that the material of each pertaining to orthodontia may be systemized and formulated with the ultimate aim of practical utility, they must be studied with the final purpose of ascertaining laws of development, not for the physical side alone, not for the psychical side, but for the living unity. This, physiological psychology aims to do. "It attempts to ascertain and combine under definite laws the facts of consciousness;" to unite in one classification the phenomena of the nervous system and of the mind.

Habit is the tendency of matter to yield more readily to subsequent influences of external force, and is manifested by increased facility of adjustment or by decreased resistance. It is the tendency to repetition, and depends upon the plasticity of matter, the physical attribute of yielding to external influences without disgregation of substance. In drawing illustrations of this characteristic from the inorganic world, Dumont says: "Everyone knows how a garment, after having been worn a certain length of time, clings to the shape of the body better than when it was new. It costs less trouble to fold a paper when it has been folded already. The sounds of a violin improve by use in the hands of an able artist, because the fibres of the wood contract habits of vibration conformed to harmonious relations."

In the organic world the "law of habit" forms a part of the groundwork of life. Every phase shows signs of its influence—the moral rules, the intellectual acquisitions, and the physical activities both of the individual and the race. It is agreed to be the cornerstone of the various theories of development, since with contractility it is fundamental in organic adaptation. It "simplifies movements, makes them more accurate, and lessens fatigue." It reduces action to the realm of the subconscious, and makes possible the highly complex adjustments and activities of our daily lives.

Of protoplasmic substance, nervous tissue is by far the most highly endowed with this property of plasticity; in fact, it owes its very existence to its expression of this characteristic. Here, however, the principle applies to inner structure rather than to outer form. The nature of the effect of stimuli upon the inner structure of nerve tissue has been a source of much speculation, yet at present there is very little definite information to be obtained. In the higher animals the nervous system links the life processes of the organism together in accordance with the external and internal conditions acting upon it, so it is quite evident that a study of the movements of an organism must be founded upon a knowledge of the nervous system, its structure and function.

Now, since habit is a tendency, its study is, in the main, the study of the influences to which it is subject. These influences are the causes of all action, and philosophers see fit to divide them into two great classes, the external and the internal. As will be seen later, this division is in recognition of the limits of our methods of investigation.

The External Influences include all stimuli from the world outside the organism; stimuli from within the organism itself other than nerve tissue, as the kinesthetic sensation of consciousness of our own movements; and also stimuli from within the brain through its association centers.

The Internal Influences include the type known as mental initiative, free will or spontaneous variation, and the idea is clearly conveyed that these are not distinct influences independent of the external class. Some of the activities of animals cannot be explained by either their present sensory disturbances, past experiences, or habits, but seem to possess a certain spontaneity of action, which stubbornly resists reduction to the great external class of influences. At times, what have seemed to be spontaneous activities have been explained, but leading writers think it wise to retain, at least provisionally, the separate class. It is quite obvious that phenomena cannot influence our ideas until they have first impressed our brain through our senses. It is of interest here to note the view of James that "A particular emotional condition is due to a particular physiological state of some peripheral tissue" received a qualifying jolt by Prof. Sherrington's observation that "A dog was capable of exhibiting much emotion even after all neural connection between a very large portion of the periphery and its brain had been severed some months previously."

Rather than discuss in detail these great divisions of influences as possible causes of habit formation, I think it more advisable, at this time, to suggest three important factors in the development of a specific habit movement. But let it be clearly understood that the division which I make is solely for the purpose of study, and is not to be thought of as distinct in effect; also, that the potency of these factors is due largely to the inherent tendency of neural tissues to repeat adjustments, and of impulses to pass more steadily along channels through which others have just passed. These divisions are, first, the nature and order of stimulation; second, the result of action; third, inherited instinctive tendencies. I name them in order of scientific value, although it seems better to consider them in inverse order, beginning with instinctive tendencies.

The conceptions of instinct conveyed by different authorities vary to quite an extent. Some express it as being of a general reflex type, called forth by a particular sensation, perception, or image. They consider instinct and reflex as synonymous, definable as "innate reactions to stimuli." Instinct they apply to the more complex reflex which may be attended by consciousness and desire. Other writers of equal authority say that a concrete explanation of instinct must be looked for, at present, in other fields than science, perhaps metaphysics, or wherever we can explain sympathy. They say that our feeling is what happens in the consciousness of animals acting upon instinct.

Professor Loeb has made a careful study of what he calls tropism—"the innate tendency of an organism to react in a definite manner to external stimuli." His investigations were made upon the simple organism of low life, and, from his point of view, a nervous system is not essential to these tropisms; organisms without a nervous system exhibited these tendencies, and also those normally possessed of such a system retained for quite a period the power of discriminating sensitiveness, after the system itself had been

deprived of its functioning power. He says in conclusion: "I consider a complete knowledge and control of these agencies the biological solution of the metaphysical problem of instinct and will."

But notwithstanding this variation in opinion, it seems agreed that the human organism is born with an extremely large number of tendencies to certain sorts of action, and that the first reaction in a given situation is strongly influenced by these tendencies, whether they are structural determinants or natural dispositions. The influence of the instinct is upon the primary reaction.

Many instincts ripen at a certain age, then pass away. Sucking is one which at birth is strong in all mammals. But it is difficult to realize its existence unless furnished appropriate stimuli during the first few days of life. In a degree the same is true of mastication. G. Stanley Hall, in his "Youth; Its Education, Regimen and Hygiene," says, "that all growth is more or less rhythmic, that there are seasons of rapid increment, followed by rest," and that "exercise ought to develop nature's first intention and fulfill the law of nascent periods, or else not only no good but great harm may be done." Suitable stimuli should be furnished at the proper time that the psychoneural and muscular forms may develop to their greatest good. The key to the order of nascent periods is in forms that race-habit has handed down and our best guide to these are interest, zest, and spontaneity. While speech and mastication use many of the same organs, those of the former are controlled from a higher level of nerve cells, and naturally follow in functional development the more basil character of the latter. By right mastication, deglutition, etc., the speech organs are developed; and unless the right stimulus is furnished at the proper time the function of mastication will never reach its full capacity. We must endeavor to realize the significance of these periods of development, they are so vital in our work and in our teaching.

Now, as we recognize the influence of instinct upon action, so shall we appreciate the restricting influence of the phenomenan of habit upon the realization of these innate tendencies. And further, the repetition of a reaction which has vitalized an instinct to the profit of the individual, if continued under conditions of abnormal nervous equilibrium and forces productive of the same, will persist and induce disproportion and deformity. May not the normal tendency for old habits to assimilate new ones, and for new impressions to revive old habits, predispose this abnormal expression under such conditions?

As yet our conception of habit does not take into account a factor which might select the movements it is desirable the organism should repeat. No provision has been made for the exercise and development of movements upon which life processes depend as contrasted with all other movements. And yet we know that some forces of reaction are more liable to be repeated than others; that painful movements are inhibited is a fact verified in the lowest living creatures. So it is that a consideration of the result of action as a determining influence upon its repetition will extend our knowledge of the significance of the law of habit as expressed in the living organism.

If a movement or action result advantageously, if it elicit a feeling of pleasure. satisfaction, relief, or desire, the chance of its being repeated is

greatly enhanced. The apparatus concerned in its exercise is strengthened. It is upon this conception that Baldwin, in his "Mental Development of the Child and Race," builds his circular reactions as a basis for imitation. He says that "Accommodation is the outcome of habit. The result of every attainment of a beneficent experience is to discharge an excessive pleasure wave of movement from which new adjustments are selected." In contradistinction to Baldwin's idea of pleasure as the determining factor in the repetition and extension of activity, Royce suggests restlessness. He says that an unsatisfactory result will lead to the repetition of movements when

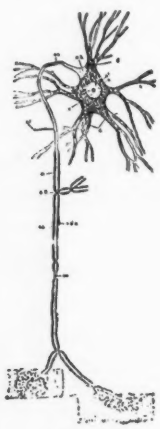

Fig. 1.

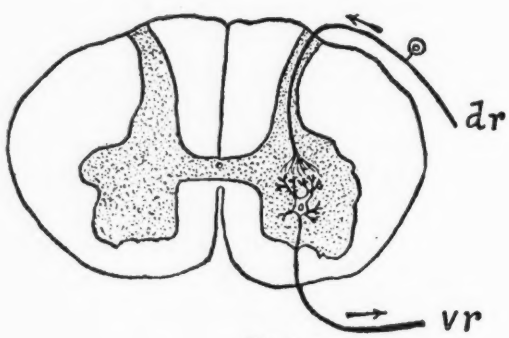

Fig. 2.

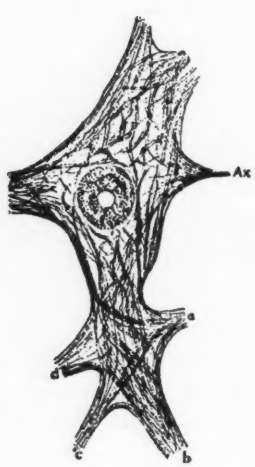

Fig. 3.

few sources for variation are available, and, under reverse conditions, to efforts at movement in new directions. It is quite evident that both recognize the determining influence of the result of action upon its repetition.

Professor Freud, in his "Three Contributions to the Sexual Theory," discusses certain habit movements in children as a manifestation of infantile sexuality. Thumb-sucking he takes as an illustration, showing how, as a result of a rhythmic sucking or rubbing contact, a portion of the skin or mucous membrane may behave like an erogenous zone, and the child find gratification in the simplest way. Notwithstanding the wide difference of opinion among his critics regarding the merits of his work, it is pregnant with many

suggestions. And one cannot fail to appreciate his viewpo'nt that every child is born with instincts which furnish desires and cravings of a primitive nature, and that these are moulded into energies of value under the influence of a healthful environment acting through a normal nervous irritability. If the reverse is true, then under the pressure of conventional civilization and an unhealthy environment, a hyper-sensitive nervous system will develop unlimited variations. Habit movements in children are, to an unknown extent, expressive of the conditions of nervous equilibrium in the growing organism.

The first factor in habit formation which I mentioned was the nature and order of stimulation. That it is the most prolific source of study can

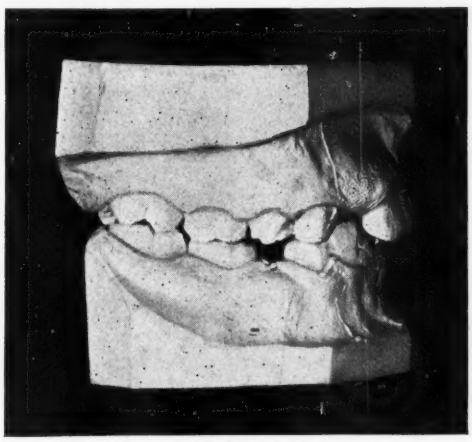

Fig. 4.

Fig. 5.

hardly be questioned in the light of the nature of our subject. We know that a habit movement is primarily the result of a reflex or impulse. Consequently a study of the nature and order of stimulation as a factor in the development of a specific habit is a study of the cause and character of the primary reaction from which the habit movement has evolved, and of the increased susceptibility, to different expressions of this primary cause, as a result of organic modification from exercise. Such a study, as intimated, must be founded upon a knowledge of the structure and functions of the nervous system.

So far as the nervous system will admit of scientific explanation, it must be considered a molecular mechanism. Such parts of it as can be controlled

for experimental purposes demand a physical and mechanical interpretation. The inadequacy of a mechanical theory, however, is obvious when we realize that to explain the acts of the nervous system is to explain that it is—since, when the nerve dies, the physiological functions depart. Nevertheless, the nervous system is a mechanism; but it is a biological one, and distinctly so. Its plan shows the marks of growth and adaptation, of modification from exercise. The structural units are arranged in a systematic whole; they are dependent upon each other for the part each plays in the system.

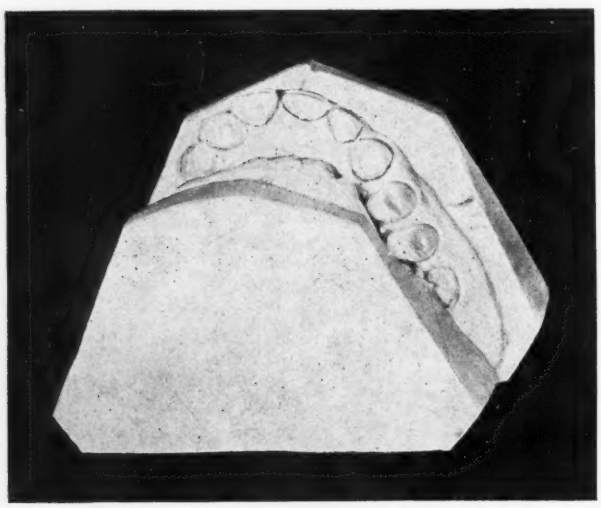

Fig. 6.

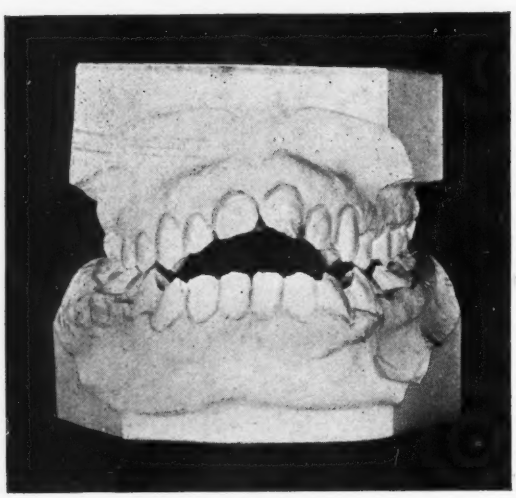

Fig. 7.

Now the structural unit of the nervous system ordinarily referred to is the neurone, the cell body and processes (Fig. 1).

The dendrite, the receptive organ; the axon, the transmissive organ. The impulse is received by the dendrite (in some cases by the cell body) and is passed along the axon to the end organs in the motor nerves, and in the sensory or centripetal nerves the impulse leaves the axon to be taken up by the dendrite of another neurone.

The boundary of the neurone where the axon of one is in close relation to the dendrite of another is called the synapse (Fig. 2).

This is the locus of great functional importance.

An impulse will pass the synapse in but one direction, from the axon to the dendrite. Though varying in degree, in many conditions it is the point of greatest resistance in the path of the centre. At the present time most authorities ascribe learning, association, memory or habit formation to improved synaptic connections rather than to modification of the cell bodies. And furthermore, as a result of the intimate relation of the many fibres and processes, mutual influences probably always exist. This general excitatory influence is evident in the phenomena observed in muscles—when a muscle is united by its motor nerve to a central organ a certain tension is maintained, if the nerve is cut the tension ceases as the lengthening of the muscle denotes. It was the recognition of this fact that led Sherrington to say that "the simple reflex is a convenient but artificial abstraction." Every centre is con-

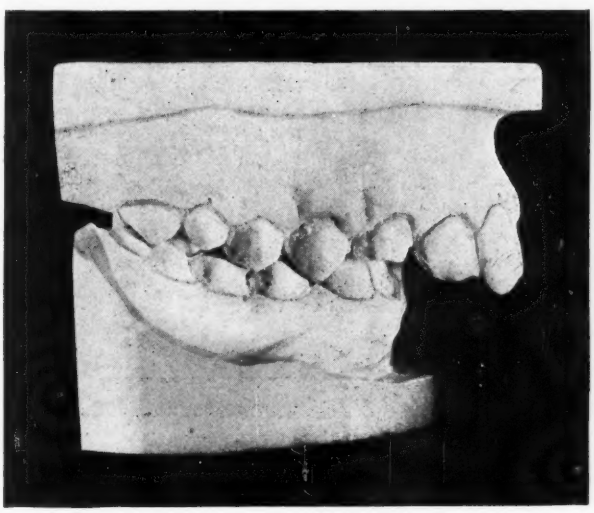

Fig. 8.

tinually subjected to some degree of excitation or other influence from the periphery, so that a pure reflex is seldom, if ever, realized. Thus it is obviously true that the nervous system acts as a whole; the deeper one carries the inquiry as to the functional value of the different parts, the more significant becomes the synapse; the more clearly the problem presents itself that not until the whole functional relation of the neuroglia to the other parts of the nervous system is known will a satisfactory answer be given. The weight of the evidence in support of the neurone theory was shifted somewhat when Bethe demonstrated the fibrilla structure of the nerve cells (Fig. 3).

If these minute fibril pass from cell to cell, as some claim to have discovered in invertebrates, then the fibril is the unit of the nervous system. The majority of competent authorities, however, still hold to the neurone theory, for until more definite knowledge is obtained it rightfully places the emphasis upon the synapse. Thus we may conclude that though many important discoveries in the general physiology of nervous tissue

have been made by experimental methods upon detached parts, the results of such experiments assume their real value through an appreciation of the fact that the mutual condition and reciprocal action of all parts are essential to the normal nervous mechanism. A scientific study of human action is inseparably linked with general nervous physiology.

Now while it is undoubtedly true that a habit movement may be the direct cause of deformity and that it is the active force with which we have to contend in the treatment of many cases, a careful study of it cannot fail to impress one with the validity of the assumption that to successfully cope with habit as a cause of malocclusion, it must be considered as other than a primary cause. Although many cases offer themselves for treatment in which the habit movement is remotely connected to its initiatory factor and so can only be influenced by positive attention to the movement itself, the advancement of orthodontia in this direction demands a more fertile conception. In no other phase of our work is prevention more vital to success. We have seen in the essence of an habitual action that it is influenced by inherited instinctive tendencies, that it is expressive of the conditions of

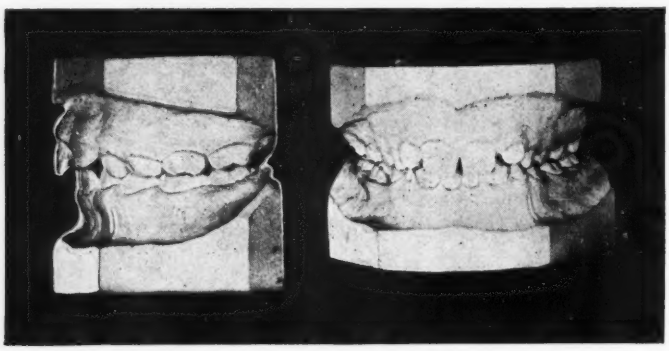

Fig. 9.

nervous equilibrium in the growing organism, and that, at its inception, it is dependent or consequent on a reflex or impulse. Thus we may infer that the sensory experiences of the masticatory apparatus determine to quite an extent the kind of action from which a habit movement may evolve. At the present time in our effort to analyze the so-called habit cases we are led into a viscious circle. But I believe that as the detail of maxillary development, as a part of the integrate whole, is unfolded, deviation which, under unstable nervous conditions, predispose abnormal activities will be recognized and removed, thus preventing the development of many of the pernicious habits to which certain types of deformity are due.

I offer the following slides as suggestive of these ideas:

High-strung, precocious child with a family history of nervous disorders of many types. There is disproportion in the size of the dental arches due to the premature loss of the lower right deciduous molar. This lack of harmony in the size of the arches is sufficient stimulus to peculiar habitual movements of the lips. The case came under my care because of the increasing tendency to place the lower lip against the lingual surfaces of the upper incisors. With the correction of the malocclusion the habit disappeared (Fig. 4).

Fig. 5.—Patient below normal, tubercular tendency. In this case the disproportion in the size of the arches is due to a malformed lower left second premolar. The patient would wipe the linguar surfaces of the upper incisors with the lower lip so quickly that the movement could only be observed with difficulty. The extent of the deformity produced is seen in Fig. 6.

Fig. 7.—Open-bite cases. Although we may determine to our satisfaction that the tongue is carried between the upper and lower teeth and is the maintaining force of such deformity, does not progress demand an investigation of the factors responsible for this abnormal relation of the tongue and teeth?

Fig. 8.—Inasmuch as this condition is expressive of the action of the tongue and lips, the habits of mastication, respiration, speech, deglutition, in fact of all the functional and structural characteristics of the part, the successful treatment consists in influencing these factors as well as modifying the shape of the dental arch. Special instruction in the technic of speech has been of marked assistance in the treatment of this case.

Fig. 9.—Normal breather—but in speech the buccinators and cheek muscles are forcibly contracted and the lips protruded. One parent of this child speaks in the same manner and has the same type of deformity. Imitation is a potent factor in child development.

The purpose of orthodontia is to assist in establishing and maintaining normal occlusion of the teeth of the human ndividual. This end we have endeavored to realize through the direct application of artificial force. The limitations of this method are evidenced by clinical experience and scientific data. Both call for the utilization in treatment of those natural forces to which all cases are in the end referred. The teeth are units of the human organism, and so bear a definite relation to the whole life history of it; consequently, an intelligent conception of the influences to which they are subject can be formed only from a thorough study of the fundamenta expressions of life activity. I have endeavored to emphasize one—the Law of Habit.

BIBLIOGRAPHY.

Wm. James:	Psychology; complete.
Josiah Royce:	Outline of Psychology.
Kirkpatric:	Genetic Psychology.
Bergson:	Creative Evolution.
Hall:	Youth; Its Education, Regimen, and Hygiene.
Sherrington:	Integrative Action of the Nervous System.
Freud:	Three Contributions to the Sexual Theory.

PLAIN AND CLAMP MOLAR BANDS.

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REGARDING the use of the two styles of molar bands employed in orthodontic work the question is often asked: "When do you use a plain band and when a clamp band?" This question can only be answered by naming the points in favor of each band.

It must be remembered that a plain band is held in place only by the cement, that is, very little firmness can be gained by the fit of the band; yet a plain band to be successful must be fitted accurately and contoured to the natural shape of the tooth.

This again brings up the question of whether the band is to be used on a permanent or deciduous molar.

In those cases in which we have a normal mesio-distal relation of the arch and little or no expansion is required in the permanent molar region, the plain band is indicated—first, because of the smooth lingual surface, and second, because there will be no need of exerting enough force to cause the band to loosen. In fact, a plain band can be used at any age if expansion of the arch is all that is to be desired. It must be remembered that plain bands are held in place only by the adhesion of the cement to the tooth and the band. Therefore it would be considered poor mechanical judgment to use the plain band when intermaxillary anchorage is employed. I am aware of the fact that many practitioners are quite successful in the use of plain bands with intermaxillary anchorage, but they do so only because they realize the amount of force their anchorage will stand and do not strain it.

In the construction of plain bands, the anatomy of the tooth must be taken into consideration. It should also be remembered that bands for permanent molars are constructed differently than those used on deciduous molars. The attachment of the peridental membrane to the proximating sides of the teeth must receive attention, as the marginal ridges are different on the deciduous and permanent molars.

In making plain bands for deciduous molars the shape of the deciduous molar must be considered. The gingival ridge is nearly straight, there is very little festoon of the mesial and distal portion of the gingival margin, and therefore the mesial and distal gingival margins of the band can be left straight and not made concave with the concavity toward the gingival.

The buccal and lingual gingival margins can be made slightly convex with the convexity toward the gingival.

However, the gingival margin of the band for a deciduous molar will present a more straight line than will a band properly fitted for a permanent molar.

Owing to the extreme convexity of the gingival marginal ridge over the root, which causes a decided ridge of enamel at the neck of the tooth, it is impossible to fit the band below the gingival border. This leaves the

gingival border of the band above the gum. No attempt should be made to fit the gingival border of a deciduous molar band under the gum on the mesial or distal side, for the shape of the gingival marginal ridge is such as to render it impossible; neither can the gingival margin of the band be fitted below the gum on the buccal or lingual side.

The greatest circumference of a deciduous molar is at the gingival margin. The band should be constructed so that it will fit snugly just above the gingival and not pass beyond. The circumference of the band at the occlusal border is smaller than at the gingival portion, as a result of which a plain band for the deciduous molar will fit more accurately and can be made with less difficulty than a plain band for the permanent molar.

The points which make the adjustment of the plain band easy, render the adjustment of the clamp band difficult on the deciduous molar. Owing to the greater circumference of the deciduous molar being at the gingival margin, the clamp band has a tendency to slip occlusally as the band is tightened, unless the gingival portion of the band is contoured so that it will grip below the gingival ridge. This adjustment of the clamp band is very difficult to accomplish without interference with the gingival tissue.

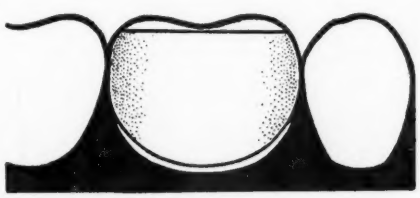

Fig. 1.—Showing distance plain band; can be carried gingivally on the mesial and distal sides and not interfere with the gum tissue. Also showing position on buccal side.

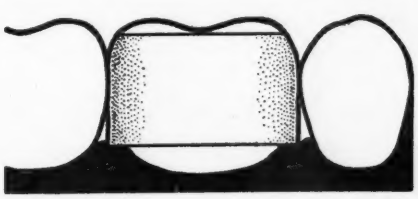

Fig. 2.—Band extending beyond contact point, causing absorption of approximal tissue.

Permanent Molars.

In the construction of plain bands for permanent molars it must be remembered that the greatest circumference of a permanent molar is at the contact point, therefore the gingival portion of a plain band must be left large enough to pass over the contact point. As a result of this the best fitting plain band, on permanent molars, can be made by festooning the approximal portion of the band and making the buccal and lingual margins of the band convex with the convexity toward the gingival. The gingival margin of the band must also be contoured toward the center of the tooth, so that the gingival margin will have a tendency to fit the buccal and lingual convexity of the crown; however, it must be remembered that the gingival portion of the band cannot be made smaller than the greatest circumference or it will be impossible to get the band on the tooth.

In order to avoid the interproximal tissue on the proximating sides, the band is festooned and should be only wide enough to extend slightly below the contact point, as shown in Fig. 1. If the band is allowed to extend beyond the contact point very far it will present the condition shown in Fig. 2, which would produce great irritation to the interproximal tissues. Therefore, the band must be made to fit the buccal and lingual sides of the tooth as closely as possible, for these are the sides which must afford the greatest

attachment for the cement. The gingival margin of these surfaces must be contoured so that it will spring beyond the convexity of the surfaces.

The fitting and contouring of the band is very important and also brings up the question of band materials to be used. Owing to the fact that iridio-platinum is stiff, it can be contoured and will spring over the tooth to better advantage.

While this is an advantage, it is also a disadvantage, for a stiff iridio-platinum band must be fitted and shaped before being put on the tooth, as it cannot be burnished with safety after being placed on the tooth. On account of the stiffness and spring of the material, burnishing will have a tendency to cause the band to spring away from the tooth at some point. Therefore, burnishing of iridio-platinum bands after cementing must be avoided.

With the softer band material, non-corrosive metals, they cannot be contoured as well and cannot be driven on the tooth without danger of crimping the edges; but if the teeth have been separated properly, the band can be burnished to the tooth on the buccal and lingual sides.

The mesio-buccal angle of all teeth is the most satisfactory place to make the pinch.

Plain bands can be constructed either over the tooth or over a model; the best fit be ng obtained by making the band over the tooth.

The principal advantage to be gained in making bands over a model of the tooth is that the band can be made by an assistant or made at a time when the patient cannot be in the office.

A compromise can be reached between the two methods by pinching the band over the tooth and soldering and finishing the same after the patient leaves and have it ready to be cemented when the patient returns.

In the cementing of plain bands, no appliance should be attached to the band. During the same sitting the band is cemented, for there is great danger of loosening the band before the cement becomes set.

In some cases an arch can be adjusted at the same time, but it is a great risk to assume.

Clamp Bands.

Clamp bands offer the advantage of being more secure, providing they are properly fitted. A poorly-fitted clamp band is a great nuisance.

Clamp bands are "contoured or non-contoured." They have the clamping device on the buccal or lingual side but the technique of fitting one is very much the same as the other.

The "stability of attachment" of the clamp band can best be obtained by the use of the "non-contoured" band and carefully fitting and contouring it to the tooth. This takes more time and skill than is required by the use of the contoured band.

An all-closing band should be used and the lap ends trimmed so that they just meet each other. No attempt should be made to make one end lap over the other, for if that is done one of the ends will wrinkle and the final tightening of the band will be interfered with.

In adjusting a clamp band, one of the proper width must be obtained. The band must be wide enough to pass below the contact point, but not of

such a width as would cause it to infringe on the attachment of the peridental membrane in the interproximal spaces. The band should not be wider on the buccal and lingual sides than it is on the mesial and distal.

The same width of band is necessary in order that the band will stretch equally on all sides of the tooth. The all-closing ends must be contoured to fit the surfaces of the tooth with which they are in contact.

In the adjustment of the non-contoured clamp band, the gingival portions of the band must be contoured toward the center. This especially applies to the approximal surfaces of the band, for those surfaces must hug the surface of the tooth being fitted, so that the gingival portion of the band will not impinge on the gum but slip between the tooth and gum.

In fitting the clamp band to the tooth, the band must be opened to such extent as to allow it to slip easily over the contact points and the greatest convexity of the tooth. Properly shaped and opened to the desired width, the band is carefully worked over the largest circumference of the tooth, care being taken to avoid the approximal gum tissue. As the band is tightened the gingival and occlusal margins draw to the tooth and the band stretches at the greatest convexity of the tooth. The greatest convexity of the tooth should be in the middle of the band, occluso-gingivally.

As the band is tightened all available surfaces should be burnished and then the tightening resumed.

The band should be left on the tooth twenty-four hours and then removed, cleansed, and cemented on the tooth.

Clamp bands, if properly made and fitted, will stay on the tooth until they tear. It is impossible to remove a properly fitted clamp band without loosening the nut or tearing the band. For this reason clamp bands are recommended where great force is required and likewise when intermaxillary anchorage is used.

Since it is possible to firmly attach the band mechanically, some practitioners have thought that cement was not needed to keep it on the tooth. The cement is used to preserve the teeth, not for retentive purposes. After the band has been cemented, if the nut or even the band itself should become loose, the band must be removed from the tooth and recemented, and thus there will be a new layer of cement upon the tooth. A clamp band that has become loose owing to the nut turning, must never be readjusted by simply tightening the nut, but the band should be removed and recemented so as to insure proper protection to the enamel. Some operators prefer to take a measurement of the tooth and cut a strip of band material long enough to encircle the tooth, and then solder the clamping device on the strip of metal. The clamp band is much firmer than the plain band and if properly adjusted will be found to be very satisfactory in those cases where difficulty is encountered in keeping the band on the tooth.

DEPARTMENT OF RHINOLOGY

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THE RELATIONSHIP BETWEEN RHINOLOGY AND ORTHODONTIA.*

BY DEAN W. MYERS, M. D., ANN ARBOR, MICHIGAN.

IN THE brief consideration of this, to me, exceedingly interesting subject, it is not my desire or intention to enter at all into a technical or hypothetical discussion, rather do I hope to suggest some practica idea , and my purpose shall have been accomplished if the effort results, some time, in profit to a few at least of our little patients.

Like the "poor that are ever with us" so are we always surrounded by a horde of unfortunate victims of abnormal respiration. Nature is a wonderful builder, but in this particular she has seriously missed the "plane." Consequently to our lot comes the responsible work of building over, and to this end our colleague in human effort, the orthodontist, has come forward with invaluable assistance; it is to suggest his usefulness to ourselves and our patients that I attempt a presentation of this subject.

Mouth-Breathing.

It has remained for this brother of ours, the orthodontist, to call our attention to the fact that mouth-breathing may result from other causes than nasal or pharyngeal obstruction. He has been able to tell us why so many of our "brilliant" operations in the nose and throat have failed utterly to establish normal respiration, and he has also been able to show us that mouth-breathing with open nasopharynx is not entirely due to that much abused term "habit." I venture to say that there is not one within the radius of my voice today who has not had one or more occasions in which he has said to the waiting parents: "Your child has no adenoids, its tonsils are normal and its nasal passages are free, therefore it must breathe through its mouth *purely* from *habit*." I will also venture that when alone, thereafter, he has asked himself in good faith: "What is habit mouth-breathing? Why should it be, when the nose was clearly intended for the purpose?" I confess the orthodontist has answered this oft repeated question for me; to him I am indebted and to him I feel grateful.

For convenience in considering this subject, let us divide mouth-breathers into two classes:

Class I.—Those who breathe through the mouth because of some nasal or nasopharyngeal obstruction, as nasal hypertrophies, adenoids or enlarged tonsils.

*Read before the American Institute of Homeopathy, Kansas City, Mo., 1909.

Class II.—Those who breathe through the mouth, but are found to have normal nasopharyngeal passages; in other words, those who breathe through the mouth because of an abnormal development of the dental arches resulting in malocclusion of the teeth.

Further, Class I may be subdivided into two divisions:

Division 1.—Nasal obstruction with normal dental arches and normal occlusion of the teeth.

Division 2.—Nasal obstruction resulting in abnormal development of the dental arches and malocclusion of the teeth.

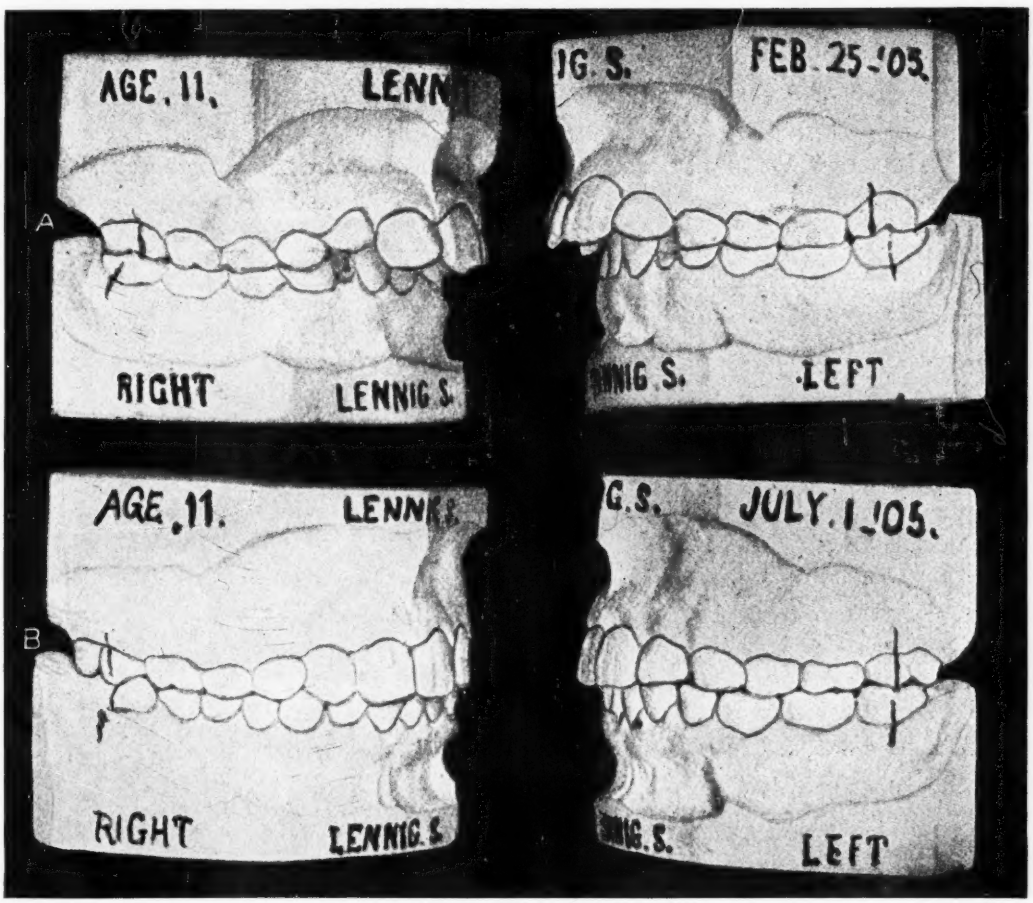

Fig. 1.—Models illustrating protruding and receding lower incisors before and after correction (Ketcham).

Class II may also be subdivided into two divisions:

Division 1.—Irregular development of the dental arches due to nasopharyngeal obstructions, these obstructions having remained long enough, before removal or disappearance, to act as etiological factors in the abnormal shaping of the arches; and,

Division 2.—Irregular dental arches and malocclusion of the teeth in which malnutrition, infantile congestive obstructions or faulty ossification processes have been etiological factors.

Etiological Factors.—As to the etiology of adenoids and other lymphoid hypertrophies, I purpose simply to suggest two classes which will, I think, be self-explanatory, i.e., (1) Those due to hereditary or constitutional

influences, and (2) Those resulting from external influences, as repeated attacks of "cold in the head," influenza, acute febrile diseases, etc., *ad lib.*

To take up briefly Class I—cases of mouth-breathing due to nasal or nasopharyngeal obstruction and its two divisions, i.e., those with (1) normal, and (2) abnormal dental arches—we find the subjects who possess normal dental arches, but an occluded nasopharynx will prove to be the ones in which the lymphoid hypertrophies have developed after the twelfth to fifteenth year, and are consequently due to external causes, as mentioned above. This class of cases is rare, being supplanted by the much more common division in which nasal or nasopharyngeal obstruction has appeared much earlier and is found to be accompanied by an abnormally developed dental arch. This type of dental deformity resulting in malocclusion of the teeth is easily accounted for, and the explanation which I shall make use of is by no means new.

I agree with Bogue, of New York, that too frequently the importance of the muscular action of the tongue in the development of the superior

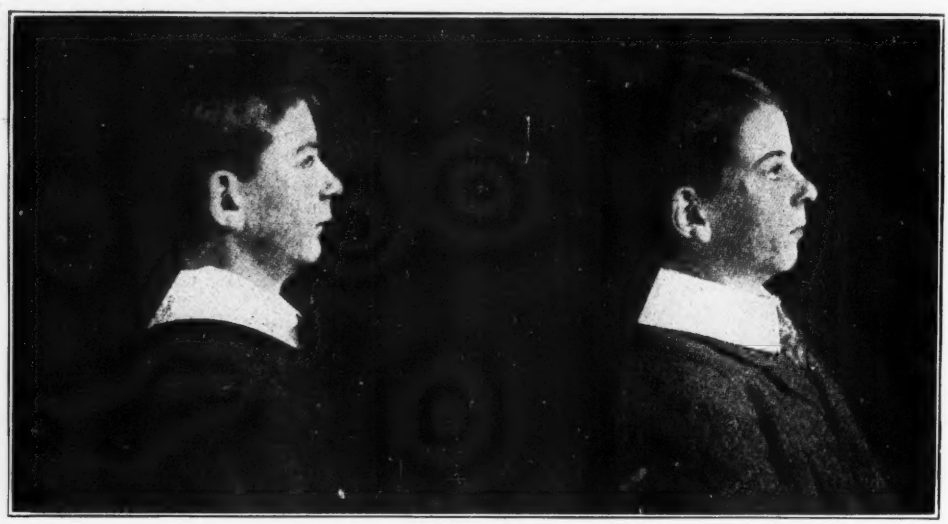

Fig. 2.—Profile of case from which model A and B of Fig. 1 were taken, showing the great improvement in facial outline as well as normal closure of the mouth (Ketcham).

maxilla is overlooked. The tongue is one of the most, if not the most, powerful muscle or group of muscles in the whole human body. Its great strength is encountered every day by rhinolaryngologists and orthodontists the country over. Its normal position when the mouth is closed and nasal respiration is taking place, is *pressed* against the roof of the mouth and laterally against the inner surfaces of the alveolar processes. It must not be forgotten that these processes are, in these subjects, pliable and subject to the greatest diversity of shape due to slight external influences. Therefore, The Great Creator intended that in the process of normal development this muscular influence should be constantly exterted from within to widen out and bring into opposition the upper arch with its fellow, the mandible. Open the mouth for purposes of respiration and this muscular pres ure is at once removed to the floor of that passage, and the maxillary arch, from lack of support from within and with pressure from without, becomes narrowed and elongated and the protruding upper incisors, so familiar to us all,

is the result. This condition accompanies nasal obstruction usually without tonsilar enlargement. Early and continued hypert ophy of the faucial tonsils, resulting in the extension forward of the lower jaw to open the oro-pharynx, gives us the prominent chin and receding upper lip of the so-called wapper-jawed individual, except, perhaps, in such rare cases of protrud ng lower jaw as are clearly due to accidental dental causes.

Considering briefly the second class of cases, i.e., mouth-breathers who have normal nasopharyngeal passages, or in other words those who breathe through the mouth because of abnormal dental arches and resulting mal-occlusion of the teeth, it will be noted that the first division of this class of individuals are the incomplete results of rhinological efforts upon cases in

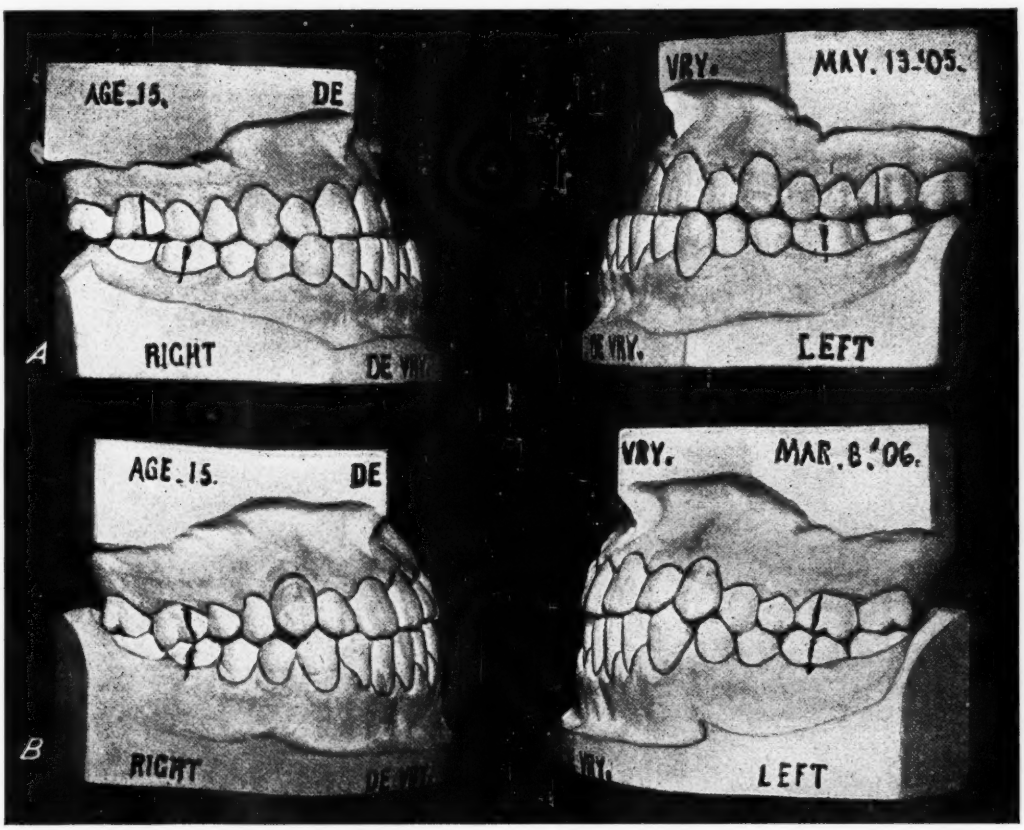

Fig. 3.—Illustrating the protruding lower jaw of the so-called wapper-jawed individual. Seen also in profile and front views (before and after treatment) in Figs. 4 and 5 (Ketcham).

Division 2 of Class I, in the above classification, adenoid, etc., having been removed, but dental deformities still remaining.

The second variety will be found to be those having irregular dental arches and consequent malocclusion, but no history of nasal obstruction will be obtainable, and I have ascribed to this variety as etiological factors, mal-nutrition, infantile congestive obstructions and faulty ossification processes.

This second class, with its two divisions as mentioned above, i.e., those in which mouth-breathing persists after normal nasal passages have been established and continues in spite of efforts innumerable to "break the habit," is the "exciting cause" for an attempt on my part to present this subject to you today. With the malocclusion developed, of whatever type,

whether it be the protruding upper incisors with receding chin, or the protruding lower jaw with depressed upper lip, or that other common type in which the jaws are very much underdeveloped and the teeth crowded and overlapped, the result must be the same and nasal respiration will not take place, no matter how free the nasal passages may be. In the first case, the

Fig. 4.

Fig. 5.

protruding upper incisors project beyond the lower lip, which, without the patient's volition, slips up behind and underneath these teeth creating an air passage by means of which the mouth is soon forced open and oral respiration follows. With the projecting lower jaw the same process, reversed, results. The upper lip recedes behind the prominent lower incisors, and

air at once passes within and the jaw drops in spite of the patient. In the type in which the jaws are very much underdeveloped, there will be found a corresponding narrowing of the nasal passages rendering nasal breathing difficult. Therefore, to sum up, *nasal respiration cannot be maintained when closure of the mouth is secured at the expense of an effort, this constant effort being necessary when malocclusion of the teeth is present.*

Prognosis.—As rhinologists we have always been ready to predict splendid results from removal of adenoid tissue, hypertrophied tonsils or any existing nasal deformity. We have pictured in glowing terms the splendid results of our many ministrations and the brilliancy of our numerous surgical sallies upon these little unfortunates. But have we not, many times, within the confines of our own consciences admitted our utter defeat?

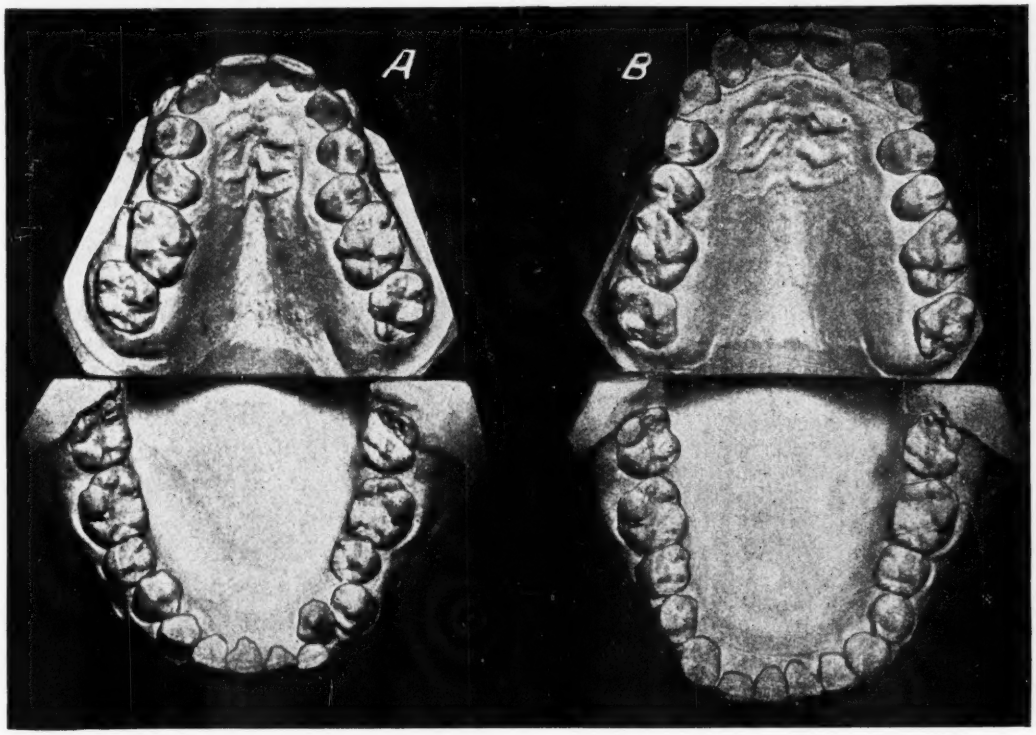

Fig. 6.—Showing an underdeveloped jaw with teeth crowded and overlapped. A corresponding narrowing of the nasal passages accompanies this condition (Ketcham).

Great as may have been the necessity for our part in the performances, and faithfully as we have carried it out, has it not been the lot of all of us, on many occasions, to find ourselves confronted by absolute failure to establish that for which we set out? And have not many, many of our patients gone on breathing through their mouths continuously after we have heroically removed "everything in sight."

From the orthodontist's standpoint the outlook is coming to be much less gloomy. Without the rhinologist to remove respiratory obstructions his work would be a failure, and so without the orthodontist to correct the dental deformities in our mouth-breathers we have been doomed to defeat and will continue to be so doomed until we recognize him and make him our most valuable assistant.

It is now a well recognized fact that the bones of the face and jaws are susceptible to great alterations in shape if taken at the proper time of life. Dentists recognize the possiblity of influencing the growth and position of the second set of teeth by giving early attention to the primary set. Thus what might become an irregular maxilla containing misplaced teeth, failing to occlude with their fellow opponents of the lower jaw, may be developed into a normally formed process by proper regulation of the first set.

With these facts before us it will be much easier to make a favorable prognosis as to complete relief from obnoxious and health impairing mouth-breathing.

Treatment.—In the treatment of mouth-breathers, two objects should always be kept in mind:

1st. The establishment of a free, open, normal nasopharyngeal passage for the air.

2d. The procuring of a normal occlusion of the teeth, or as nearly so as possible, that nasal respiration may be maintained.

Fig. 7.—Photograph of case shown in Fig. 1, taken February, 1909 (Ketcham).

The methods for the first requisites are so well known to all that comment upon them is wholly unnecessary. For the second a few words may not be amiss.

Dr. Angle—a celebrated orthodontist, the first to discover the upper first permanent molar as a fixed point in the arch from which to make a diagnosis—speaking from the standpoint of his profession, says that "in the treatment of all cases of malocclusion our efforts should be toward the accomplishing of three main objects:

"First, correction of malocclusion.

"Second, establishment of harmony in the relation of the jaws.

"Third, improvement of the facial lines. In the accomplishment of these, our efforts should be toward the ideal, where normal occlusion, normal relation of the jaws and harmony of facial lines are combined. While the

ideal is not always possible to attain, yet the best attainable results cannot be hoped for with a lesser standard."

To these I would add a

Fourth, *i.e., the establishment of normal respiration.*

Indeed, I would class this as the first and most important object to which all efforts of both rhinologists and orthodontists should be directed. In this day of progress, when we are hearing so much about the great white plague, and the noble battle being waged against its ravages, it seems to me that we cannot do better than to consider seriously the influence of abnormal respiration as an etiological factor in the development of pulmonary tubercular affections, for where better can the treatment of phthisis pulmonalis be commenced than before the diseas has actually begun? I believe that all our efforts toward the stamping out of this great scourge will be of no avail until we recognize the importance of, and meet the conditions existing before the disease has actually started.

To this end we must recognize the great importance of the normal functions of the nose. As is well known, its principal duty, so far as respiration is concerned, is to warm, moisten and filter the inspired air. We know that at 32 degrees F. air, to be saturated, requires 2.1 grains of water to the cubic foot. According to Aschenbrandt and Kayser, the inspired air receives from 20 degrees to 40degrees of heat and becomes saturated, or nearly so, in its passage through the nose. This renders it suitable for the interchange of oxygen and carbonic acid gas in the lungs, a simple action of osmosis which takes place most perfectly when with warm fluid on one side of a membrane there is warm, moist air on the other. Bosworth concludes that the nose must supply in twenty-four hours about a pint of moisture for this purpose, which it obtains from the sinus tissues of the turbinates, together with the tears and the secretions of the muciparous glands.

The function of the nose in filtering the inspired air is practically perfect, Tyndall having demonstrated that expired air is free from germs. St. Clair Thompson and Hewlett, a few years ago, concluded that the nose does not offer as fertile a soil for micro-organisms as does the oropharynx, for according to their researches the occurrence of micro-organisms on the Schneiderian membrane is so infrequent that their presence must be regarded as quite exceptional. Paget confirmed these results, finding the nasal cavities in the normal state free from microbes except at the anterior part and vestibule. He concluded that the asepsis of the nasal cavities is due to the structure of the canal, to the ciliated epithelium, and to the germicidal quality of the mucus, which he found was absolute for anthrax, very marked for the Klebs-Lœffler bacillus and less so for the staphylococcus and streptococcus organisms. Tyndall found that in the passage of the air through the nasal cavities its cleansing was accomplished by the action of the vibrissæ, the hairs of the vestibules which hinder the entrance of large particles, and by the adherence of smaller particles to the moist surfaces of the intricate passages of the nose and the nasopharynx. These surfaces are in turn cleansed by the action of the ciliated epithelium and the flow of mucus.

Regarding the tubercle bacillus, Allchin in his Manual of Medicine has the following to say:

"The tubercle bacillus is the direct cause of the various forms of laryngeal and pulmonary tuberculosis. There are three modes in which this bacillus may gain access to the respiratory tract, namely, inhalation, in-

gestion and inoculation. By means of inhalation the bacillus is carried directly to the part which it affects. Numerous experiments have shown conclusively that the inhalation of air in which is suspended dried tuberculosis sputum will induce tuberculosis in even the most refractory animals. In the case of man it is by inhalation that the disease is most usually contracted, and we find that the lungs and bronchial glands are far more frequently affected with tubercle than any other parts of the body. A phthisical patient may, in the course of the day, expectorate millions of bacilli, and if he is careless in the disposal of his sputum must infect the place where he lives. It has been proved that dried sputum will retain its virulence for a long time. Experiments with dust collected in various quarters of Berlin by Cornet showed that nearly 33 percent of the specimens were infective, the dust being most frequently virulent in hospital wards and in private rooms occupied by consumptive patients. Recent experiments made by Coates, in Manchester, show that in houses which have been occupied by careless consumptive invalids the dust is infective in more than 50 percent of the cases. In no instance was the dust of even the dirtiest houses found to be infective, when no case of tuberculosis had occurred in them during the previous three years."

This being true, it is not difficult to conclude that mouth-breathing may, in many instances, be directly responsible for pulmonary tuberculosis. With the nasal passages closed, the mouth is opened for purposes of respiration, and the heavily loaded air containing tubercle bacilli, streptococci, staphylococci, pneumococci, the Klebs-Lœffler bacillus and many more, is rushed directly into the larynx, trachea, bronchi and bronchioles.

So I repeat, that I would make first and most important in our treatment of these conditions, the idea of normal nasal respiration, that the air may be filtered, warmed and moistened before it enters the delicate tissues of the lungs.

Quoting from a recent article by Dr. E. A. Bogue, of New York, upon the relation of the dental arches to pathological affections of the nasopharynx, we have the following:

"Now that we know something about the proper size and relations of the dental arches, we know how mastication should be performed to get the greatest degree of vigor from the food we consume, and we know what steps should be taken to permit the child afflicted with adenoids to close its mouth.

"Dr. I. B. Davenport, of Paris, discovered in 1886 what normal dental arches were; also, that in civilized communities normal dental arches were rare. A few years afterward the late Dr. Bonwell, of Philadelphia, discovered that a mathematical relation existed between the width of the permanent upper central and lateral incisors and cuspid and the entire arch, and from the measurements of these three teeth he was able to construct the entire arch as it should be when normal.

"When thus normally arranged, it is found that all the teeth growing in one jaw articulate with the teeth of the other jaw to furnish the largest area of grinding surface. The cusps and the sides of the cusps, and the sulci into which they fit, all combine to furnish not only the best masticating surfaces, but to form dental arches that for strength and durability cannot in the human species be excelled. The cusps of all the grinding teeth in such

arches, interlocking with their antagonists, prevent any variation in position of any of the teeth laterally or anteroposteriorly.

"Dr. Hawley, of Columbus, Ohio, recognizing these facts, adapted Dr. Bonwell's discovery to the use of the orthodontist. The result is that today by measuring the width of one upper central incisor we may determine approximately the shape and size of the arch in which that tooth belongs, and may draw it on paper so accurately that we may work to that arch with confidence. If there is any slight variation in the sizes of the various teeth in the same mouth and we work up to the model, nature will make all proper correction in the way of diminution and adjustment to type without assistance, and at the same time without any injury to size or strength or the adaptation of the arches to each other."

It is not my intention to enter into detail at all regarding the various methods of correcting nasal or dental deformities. Methods of correction applying to nasal irregularities are familiar to every practitioner. Correction of dental deformities must, of necessity, be left to the orthodontist. I am satisfied if this brief paper shall call to your minds a method of relief for your little patients, who still breathe through their mouths after all your careful ministrations.

I am indebted, in addition to credit already given, to Dr. Milton T. Watson, of Detroit, Mich., Dr. S. E. Dodson, of Grand Rapids, Mich., and Dr. Martin Dewey, of Kansas City, Mo., for many valuable suggestions from the standpoint of the orthodontist.

DISCUSSION.

M. A. Barndt (Milwaukee): This is a field in which I have been doing more or less thinking for some time. Like many others, have operated upon children for tonsils and adenoids and other nasal obstructions, and did not obtain the results that I expected; after meeting with a few of these cases I began to look farther into the subject and found that in many cases where the palatine arch was very high with malocclusion of the teeth, I had to be very cautious as to my prognosis. I specially remember one case of a little child that I had operated upon with comparatively no benefit; the dentist with whom I am associated began to regulate the teeth, to separate t e palat ne arch, and when all was completed, we had a splendid result. Thus in my opinion all cases should be looked over carefully and all points taken into consideration. For simple removal of the adenoids, tonsils or perhaps a shrinking of the turbinals in cases where the palatine arch is high and there are other dental deformities, we must be guarded in our prognosis, otherwise we may be disappointed in our results. In cases of simple removal of the tonsils and adenoids or hypertrophied nasal tissue, where there is no malformation of the teeth, jaw or arches, we can obtain most excellent results, but if there are other obstructions we must certainly look farther, and the help from the orthodontist is certainly very gratifying.

The pressing of the tongue upon the palatine arch, the muscles of the cheek crowding the jaws together, the effort made by drawing air through obstructed nostrils, are all factors in maintaining these deformities. Other factors will aid somewhat in correcting these deformities, but are not sufficient to overcome the difficulties and form a perfectly shaped head and face. In my opinion the methods of correcting these deformities should be left entirely with men of experience along this line. I am satisfied that when we do all that we can in our line of work and do not meet with results, our patients are more than grateful if we can offer them something that will give them more relief by turning them over to the orthodontist.

Martin Dewey, M.D., D.D.S., (Kansas City): It has long been known that some relation existed between those who treat conditions and operate above the floor of the nose and those who do the same below the floor of the nose. Rhinologists have recognized the

importance and need of someone that could obtain results in certain cases after they had done all they could. It is a fact, as Dr. Myers has stated, that the orthodontist was the first to call the attention of the medical world to the benefits which could be obtained by the proper treatment of this class of cases which have so long troubled rhinologists. You may not realize that in a large number of cases your final success is dependent on the work of the man who successfully treats teeth and dental arches. However, you can feel a sense of satisfaction by knowing that he too is dependent upon you in a large number of his cases. As I will show you, operations which are performed upon the teeth with a view of producing normal occlusion, the correction of dental deformities, play a large part in the proper development of the nasal cavities and thereby removing the existing nasal deformities in a large number of cases.

I will confine my remarks to mouth-breathers and to that class of patients who are, or have at some time been, sufferers from adenoids. This does not include all the cases in which the rhinologist and orthodontist work hand in hand, but for lack of time I cannot discuss all of them. And here I must warn you, there is a vast difference between the orthodontist and dentist; as much difference as there is between the rhinologist and general practitioner.

Experience has shown that there are different types of mouth-breathers, but I must again confine myself to that type which we find have been the result of adenoids, or, more correctly, lymphoid tissue. Experience has shown that this class of patients early in life have possessed normal dental arches and nasal cavities, also, that if the nasal obstruction was removed early enough the deformities would not take place. However, we as specialists hardly ever see these cases until enough harm has been done to call the parents' attention to the fact that the operative treatment is all that will give relief. If the nasal obstruction exists any length of time, mouth-breathing being persisted in during that time, we find deformities of the dental arch always result; these in turn have an evil influence on the nasal cavities.

After seeing the same class of cases so many times, we have come to the conclusion that adenoids are responsible for that class of malocclusion which is characterized by protruding upper anterior teeth, narrow upper arch, receding mandible and teeth, short upper lip and abnormal lip functions. In addition to cases in which adenoids are present there are also cases without adenoids; this only proves that the adenoids have disappeared for some cause and that the malocclusio is the mark which they always leave if they have been present any length of time. Therefore, an early removal of the adenoids is important; do not allow them to atrophy, as I find some recommending, for before they atrophy we will have a great deformity developed in the arches.

It is in the class of cases referred to that the rhinologist and orthodontist must work hand in hand. As Dr. Myers has said, you have operated on cases and removed everything in sight, yet the patient went on breathing through the mouth, not from habit but from necessity; necessity, because the dental arches are so deformed that the patient *cannot* close the lips without an effort which he will not make. Necessary, because the mouth-breathing has not only deformed the dental arches but has exerted an influence on the nasal cavities.

It is a fact that you cannot have any marked deformity of the dental arches without a deformity of the nasal cavities. As a result of this the "habit" cases breathe through the mouth because they cannot get the proper amount of air through the nasal openings. It is also known that you cannot remove this nasal deficiency by operating on the nose by any operation known to rhinology. The only help that I know of comes from the orthodontist after you have removed the nasal obstructions.

Some of you will no doubt ask, "How does this lack of development of the nasal cavities take place and how is it influenced by treatment of the dental arches?"

In the beginning I will say that while the orthodontist seems to be operating on the teeth directly, he is also operating on all of the bones of the face. The influence of his work cannot be estimated by what he does by way of improvement of the position of the teeth. When the lymphatic tissue has hypertrophied to such an extent as to obstruct the passage of air through the nose, we find the mouth-breathing takes place. As all of the muscles which depress the mandible also pull it backward, the mandible is *held back* to a certain extent; this continued abnormal muscular pull, day and night, soon has an evil effect on

the development of the body of the mandibles. This accounts in part for the receding chin which we find in these cases.

Also the position of the tongue when the mouth is open influences the position of the lower teeth. Instead of occupying the entire oral cavity, we find it lying in the lower portion of the mouth and then not in its normal shape, but pulled down and back by the action of the hypoglossus; that is, the anterior end is pulled back so as to remove the pressure of the tongue from the anterior teeth. The position of the tongue in the normal breather has been spoken of by other men, and I will state briefly what it is and the influence it has on the growth of the arches and nasal cavities. In its normal position it fills the entire oral cavity. When the mouth is closed after speaking, we very soon swallow. In doing so a vacuum is formed and the tongue is forced against the roof of the mouth and against all of the teeth. The suction of the tongue against the roof of the mouth pulls the vault downward. There is also a lateral thrust of the tongue against the sides of the arches, which tends to stimulate their development in that direction. The continued action of the tongue as described in the course of weeks, months and years would amount to a great amount of force having been exerted. In mouth-breathing we find all of this is absent and the lack of it accounts to a great extent for the high vault and narrow upper arch which we have spoken of.

I wish to state that I do not think the vault or roof of the mouth, or arch of the palate (call it what you will) has been forced up, as some have said, but it has failed to be forced down. As the mouth is held open in the beginning of mouth-breathing, the teeth are apart. This invites a downward growth of the teeth and alveolar process which takes place. The vault does not grow down as rapidly as the process; therefore, in a short time it is high as compared to the teeth and process. In fact it is high as compared to the ethmoid bone; but do not get in the habit, as some have, of saying it has been forced upward. It is retarded in growth, caused by the lack of the suction of the tongue and the lack of nasal respiration. There may be other factors which exert an influence, but these are important and must be taken into consideration. With every normal act of respiration there is a force exerted in the nasal cavities which during the growing period of the child, is very necessary. It not only tends to expand the nasal cavity but also expands the sinuses as well. Therefore in mouth-breathers we would expect the underdevelopment which we always find.

The effect of the muscular action on the mandible has been spoken of. We also find that muscular action plays an important part in the shaping of the upper arch. During normal-breathing the orbicularis oris is active in closing the lips. When the lips are inactive, as they are in mouth-breathing, no pressure is exerted on the anterior teeth. The upper anterior teeth are permitted to protrude because of the removed pressure. They are further aided in the protrusion by the patient being forced to moisten the anterior part of the palate either with the tongue or lower lip. Each act just described pushes on the upper anterior teeth, as a result of which we soon have a glaring deformity. After the teeth and arches have become malformed the patient cannot close the lips without an effort, and mouth-breathing will persist regardless of what the rhinologist may do.

As a result of the chain of events which I have briefly called your attention to, we find the typical case of malocclusion and nasal deformities developed, the treatment of which we will now consider from the standpoint of both rhinologist and orthodontist.

The first step is the removal of adenoid tissue and other obstructions which were the beginning of the condition. Our next step is the changing of the position of the teeth and arches so as to establish normal occlusion, make it possible for the patient to close the lips, and stimulate the proper growth of the nasal cavities. You must remember that the maxilla and intermaxillary bones support the teeth of the upper arch. Also that they contribute to the formation of the walls and floor of the nasal cavity more than any other bones. You should now see the influence which their malformation exerts on the size of the nasal cavity. Take the typical case of narrow upper arch and high vault. By expanding the dental arch, we find the vault is pulled down. Take a visiting card and hold it between the thumb and finger in such a manner as to produce an arch. Release the end and you will see the arch come down. That is what takes place when the dental arch is expanded in the treatment of these cases.

The floor of the nose is pulled down to such an extent that deviation of the septum has been corrected. In fact we can expect such to be the result in 90 percent of deviated septums found in [young] mouth-breathers of the type spoken of. I should say 100 percent,

for in all cases where the patient has been examined by the rhinologist before and after treatment the septum has been straightened. As the number so examined is not great we cannot be too sure of the continued success, but everything points to as good results in the future as we have had in the past.

With the pulling down of the floor of the nose, straightening of the septum, we also have an increase in the lateral diameter of the nose. This greatly increases the nasal space, and after the arches have been so changed that the patient can close the lips and teeth everything is favorable for nasal respiration.

You now see how, by enlisting the aid of the orthodontist, you will be able to do things for your patient that you have heretofore considered impossible. In doing the most good for your patients you must recognize the necessity of the orthodontist as he has recognized his inability without your aid. If I have succeeded in impressing upon you the relation between rhinology and orthodontia, I feel greatly repaid.

H. S. Weaver (Philadelphia): There is just one thing that I wish to call attention to, and that is the age of the patient; you will find that adenoids are not limited in their occurrence to children. Within the last year I operated upon a man for adenoids where the postnasal space was entirely filled with them. He never remembered being able to breathe through his nose, and hence had probably had them all his life. He was an unusually heavy set man, weighing about two hundred pounds. Owing to the age of the patient I thought the trouble could not be due to adenoids. I tried to get a view of the postnasal space with the rhinoscope but could not. I then introduced my finger and found as typical a case as I ever found in any child. At the operation I found the adenoids tough; the curette was useless, I could not do anything with it. I finally had to go in with adenoid forceps and literally tear them out piecemeal.

The dental arch was contracted, the teeth protruded and the nose was not well developed. His age was forty-nine. I do not remember ever seeing a case of that age reported. I had to do some work on the turbinated bodies. I obtained fair nasal respiration; he breathes through the nose as long as he is awake but at night still uses his mouth.

E. W. Beebe: Were the growths fibrous in character?

Dr. Weaver: They were fibrous and as tough as leather.

Isaac C. Soule (Kansas City): I had last year an interesting case that illustrates the influence of abnormal formation of the dental arches. The patient was seventeen years old with poor development of the nasal organs owing to partial occlusion of the postnasal space by adenoids. These were removed without any appreciable effect on the mouth-breathing. I urged the parents to go to a dentist and have the teeth attended to, but could not influence them. Shortly after the girl was in an accident, being thrown out of a buggy while the horse was running away. The upper teeth were knocked out and the alveolar processes crushed. Then she had to be taken to a dentist, and as a result of the accident and the work done some of the narrowness of the dental arch was relieved and she has breathed better ever since.

C. Gurnee Fellows (Chicago): Somebody suggested that it was impossible to send a patient to an orthodontist in most parts of the country because there were not many of them; it was not possible to send a patient to an eye or ear specialist twenty years ago, except in the largest cities.

If we find that the orthodontists are a help to us, and we begin to make use of their services, it will not be long before there will be plenty of them, and we can avail ourselves of their help even in the smaller towns. I have sent cases to dentists many times, but now that I have learned something I never knew before I shall send them to the orthodontist for an opinion in regard to teeth and mouth deformities.

Burton Haseltine (Chicago): It is no doubt a fact that we have not fully enough recognized the bearing of mouth trouble upon certain cases of mouth-breathing, but it would be a serious mistake to suppose that any large number of septum deformities can or could be cured in this way. As a rule the septum deformity is a late thing. It does not usually come to us until some time after the mouth-breathing habit has been established. The widening of the dental arch might correct a slight curve perhaps, but the usual septum

deflection is a much more complicated thing than simply a bending pure and simple of the septum to one side; it is thickened and hypertrophied, much more like those callosities that occur around the ends of broken bones that are not properly approximated. Such a condition cannot be cured by any pulling down of the palatal roof or straightening of the dental arch. No doubt the orthodontist could prevent the deformity by his work in the mouth if he saw the case early in life, but by the time we generally see them, deflections of the septum require operative work in the nose and often extensive work, too.

Dr. Weaver: I should like to know what the doctor's experience has been in regard to the recurrence of jaw malformation after operation for its correction. I have seen cases where the deformity was returned within a year after the operation almost as bad as it was before.

Dr. Dewey: The removal of a malformation without the removal of its cause is not a cure. Remove the adenoids by all means, but they will come back in all probability unless you also remove that prior condition upon which they are based.

Dr. Myers: I am very glad this paper has brought out the discussion it has, and hope it may serve to call attention to an important but neglected subject. From what Dr. Haseltine has said I think he misunderstood Dr. Dewey. Dr. Dewey means that the case must be taken in its early stages in order to correct septal deflections. He did not mean that orthodontia would correct deformities depending upon thick calluses. We often find in cases of apparently deflected septum that there is no depression of what should be the concave side, but instead simply a thickening of the septum in the occluded side. Of course no one would expect to correct a deformity of that kind simply by work in the mouth. But this work is invaluable in its place. Dr. Weaver's case was an interesting one; the adenoids had been there since a very early age and had never cured themselves nor been removed. Adenoids do not always disappear with advancing years. If in that case there had been an operation early for their removal and nothing else done they would have recurred. With dental deformities uncorrected, our adenoid operations are very often failures, and we have noticed again and again the recurrence of adenoid tissue and the regrowth of the tonsils. Another point that we should notice is the needless and promiscuous extraction of teeth, much irreparable deformity resulting therefrom. A whole lot might be said upon that subject, and we should put forth every effort to stop the practice.

CURRENT LITERATURE

EDITED BY H. C. POLLOCK, D. D. S.

More About Emetine.

Bass reported one hundred cases treated with emetine given in 1/2 gr. doses hypodermically, and results obtained according to this report are remarkable. That this treatment will cure pyorrhea remains to be proven to the dental and medical professions. Local treatment and prophylaxis, and its possibilities, is probably better appreciated by the dental profession than it is by our medical brethren.

In *Clinical Medicine* for January, 1914, we have a report of a dentist who employs this treatment:

"I am using emetine hydrochloride in pyorrhea, hypodermically injected in the subcutaneous cellular tissue; giving 1/2 grain daily for three successive days, then every fourth day until the gums are entirely healed and the teeth become tightened in place. I also employ it locally to the pockets and walls of the pockets by means of a syringe, using a 1/2 percent solution. The patient is directed as to the care of the mouth and teeth along prophylactic lines and told to wash the mouth after every meal with a good antiseptic wash, followed by a few drops of fluid extract of ipecac, applied to the gums and teeth by means of the toothbrush. The permanency of the effect is due, I am sure, to the fact that the pyorrhea-pockets are treated locally until they heal.

"Instrumentation is absolutely necessary in every case. Tartar scales must be removed. Ill-fitting bridges and crowns must be removed and projecting fillings must be polished smoothly to the tooth before the general treatment is begun, in order to do away with all conditions that tend to produce irritation and prevent granulation.

"I believe emetine saves me much time in treating my cases. While it is too early to make a very definite statement as to permanent cure, the results I am having with a number of cases under my observation are gratifying, and there seems to be good reason for believing that cures can be effected in at least a certain proportion of the cases."

A Plea for the Phagocyte.

Ewing, of St. Louis, has raised his voice in protest against the surgical propensity of tonsilectomy. For a long time it has been the vermiform appendix which was the relic of the process of human evolution, but of late surgery has turned more to the tonsil as the superfluous tissue which is capable of doing a great deal of injury and absolutely incapable of doing any good.

Ewing contends that the tonsil is the recruiting station of the phagocytes where they get together and array themselves in organization to fight the invading army of bacteria in the blood stream. The tonsils, says Ewing, are the base from which the phagocytes march away to fight the battles for our lives and existence. If we remove the tonsils from the rising generation,

the rising generation may be left without phagocytes to fight their battles for them and will fall victim to the army of invading bacteria which are responsible for a great many of the ills which poor human beings fall heir to. These bacteria will be able to make their attack unresisted.

The technical points are to be discussed only by those who by study of this subject have a right to form an opinion, and we think they can be relied upon for that. We can but note a growing prejudice against surgical interference among the laymen, and it is to be hoped that the attitude assumed by the medical profession in regard to the tonsil is based upon a secure scientific foundation.

The Pituitary.

Of late more and more attention is being attracted toward the anterior obe of the pituitary gland (the hypophysis) and its phenomenon related to tissue development, particularly of the skeleton. The peculiar disease known as "acromegaly" is definitely associated with disorders of this gland. If it is accepted that our activity of the hypophysis causes increase of skeletal growth, it is interesting to note the discussion by Cushing on "Surgical Experiences with Pituitary Disorders" in the *Journal of the American Medical Assn.* (October 31, 1914, p. 1516.)

"Returning to the influence of the posterior lobe of the pituitary gland, Cushing says that whi'e little is known of hyperplasia of this body, this portion of the gland appears to be more concerned with tissue metabolism than the anterior portion. When it is rendered inactive by disease or by compression, metabolic processes are checked; a high tolerance is acquired for carbohydrates, which are promptly stored as fat; there is drowsiness, insensitivity, slow pulse and respiration, with a lowered respiratory quotient, a subnormal temperature, low blood pressure, and so on. This complex of symptoms, as has been pointed out, in some measure simulates the phenomenon of hibernation, a state in which the metabolic fires burn low, and one in which marked histologic changes have been shown to occur in the gland —changes which suggest a seasonal wave of physiologic inactivity.

"It is interesting to learn that many symptoms formerly obscure as to their origin, can be explained by over-activity or under-activity of the pituitary body; for instance, this is particularly true as regards many forms of obesity or its opposite, emaciation. Decided loss of flesh has followed the administration of posterior lobe extract over a long period; and, as already pointed out in *Clinical Medicine* (February, 1914, p. 110), polyuria or symptomatic diabetes insipidus may be caused by disease of the pituitary. Other symptoms to which such diseases may give rise are undue drowsiness, various psychoses, and sexual disorders, such as amenorrhea in women or impotency in men.

"It is interesting to learn that a good deal can be accomplished by the surgeon in the treatment of diseases of pituitary origin. For instance, one of the most disturbing complications of pituitary tumor is the blindness or other visual disturbance resulting from pressure of the tumor growth upon the optical chiasm. In a few cases operated upon by Cushing the loss of vision has been arrested or even partially restored by removal of a portion of the tumor. The tumor is approached by the surgeon through

an incision made beneath the under lip, the tumor site in the postnasal cavity being exposed by a speculum introduced at this point.

"Cushing reports operative experiences with 95 cases, giving an operative mortality of 5 percent and a case mortality of 10.5 percent."

The Social Status of the Dentist.

It is only occasional indeed that the members of the dental profession are able to enjoy the privilege of reading a symposium treating of their social status, and it is a rare treat to peruse this subject handled in so able a manner by one Philip Skrainka, who writes: "It would be hard to show that the social position of the dentist is what it should be or convince an obdurate medical profession or that part of the laity that makes the social laws, that a dentist may at times approach the mental and physical graces of other professional men." It is jocular in regard to the "obdurate medical profession," and we are at a loss to know whether the doctor and man of letters is an adept at irony or whether he believes this subject is really of some concern to the medical profession. In an editorial in the June, 1914, issue of the *Interstate Medical Journal*, Skrainka says:

"There are perhaps no two countries in the world where the social conditions are the same and especially where professional men enjoy the same degree of social recognition. In Germany, for instance, the man who can attach the title of professor to his name stands head and shoulders above the most celebrated literary man or painter who has seen fit to turn his back on academic honors, no matter whether the professor is a dryasdust product and the writer or painter a man of genius. Who has not smiled because of the great significance the Germans attach to the title of Herr Professor, or has not been tickled into uncontrollable laughter by the assumption of the professor's honors by his worthy wife, who not only insists on servants using the title when addressing her, but demands full recognition from her acquaintances! If we wander to France a complete change greets us, and the literary man, the artist and others who have done outstanding work rank much higher socially than the professor, be he ever so well known, not because the French are not a highly educated people, but because they worship at the shrine of genius and are about the only people who are capable of recognizing this rare quality, despite what Bernard Shaw says of them in regard to their neglect of Brieux and Rodin. And in England, is it not a fact that the untitled physician or surgeon is a negligible quantity, socially speaking? And in this country are we not already bestowing a title on the surgeon, and making much of other foolish distinctions, such as the reversal of what obtains in England today: the placing of the surgeon above the physician? But in all countries the dentist fares worse than any other professional man, and though his preliminary education—and now we are speaking of the United States—has been acquired in a school of considerable standing, directly he gets his degree in dentistry the social ban is placed upon him by the merchant, the banker, and even by the majority of physicians and, of course, by all the surgeons.

"No doubt there will be some readers who will attempt to controvert our statements by recalling the historic occurrence of the ex-Empress Eugénie fleeing to Dr. Thomas Evans, the American dentist in Paris, for pro-

tection against the angry mobs after the battle of Sedan, and with what gallantry he escorted the Empress of the French through the crowds until she was out of harm's way, thus showing that the social status of Dr. Evans must have been of the highest, otherwise such confidence would not have been reposed in him. And no doubt there will be some who will point to this or that dentist in a European capital, who must have had, besides an extensive clientele, a foothold in society, otherwise there could not have been the elopement with the titled lady which recent history has chronicled not once but quite a number of times. But armed even with these data the friendly critic would be hard put to show that the social position of the dentist is what it should be, or convince an obdurate medical profession or that part of the laity that makes the social laws, unjust though they be, that a dentist may at times approach the mental and physical graces of other professional men.

"In a novel which we have recently read—'The Joy of Youth' by Eden Phillpotts, Hastings Forbes describes the elopement of his wife in the following trenchant words: 'She leaves a letter for me. * * * The cynicism—the bitter cynicism! A bolt from the blue. In a word—a dentist! A wretched dentist from Exeter. I believe his beastly name is Wicks. * * * He's an American dentist. * * * She has gone to Italy with him. * * * Fancy having secrets with a dentist! I feel as if I ought to shoot him, Vane. But, then, who could shoot a dentist?' Here we have the whole social status of the dentist of today summed up, for though the speaker is an Englishman, we have no doubt the same flow of language would emanate from an outraged and irate American whose wife had demeaned him in the eyes of the world by eloping with a dentist. Now it is a fact that physicians and even surgeons have eloped with other men's wives in novels and also outside novels, but has anyone ever seen the statement in print or heard it in the streets or in his club that the offender was too low to be shot. Unfortunately, when this social upheaval occurs, the doctor is invariably wounded or killed, which occurrence, though untoward, nevertheless carries with it the distinction that he is worthy of being noticed by the grief-stricken husband. And the inference must be, if we are to believe what Mr. Phillpotts puts in the mouth of one of his characters, that the dentist will never be the social equal of other men until under similar circumstances he becomes the mark for a well-aimed pistol. Does the dentist wish to reach the social heights by being singled out in this manner or would he rather remain in his present social obscurity? This is a question which only he can decide."

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EDITORIALS

A Correction.

THE paper by A. H. Ketcham, D.D.S., Denver, Colorado, on "Report of a Class II, Division 2 Case, Treated with Dr. Edward H. Angle's New Pin and Tube Regulating Appliance" which appeared in the January issue of this Journal, should have been credited to the European Orthodontia Society, as this paper was read for Dr. Ketcham by Dr. Ottolengui of New York, at the meeting of the Society held in Paris, July, 28, 1914.

Nomenclature.

THERE was considerable discussion at the last meeting of the American Society of Orthodontists concerning the use of terms as employed in that branch of science which we represent. The American Institute of Dental Teachers has for some years had a Committee upon Nomenclature and certain dental terms have been decided on. Authors of text-books intended for use in dental colleges have endeavored to follow a certain nomenclature, and especially in dental anatomy writers have employed terms which have a certain meaning when used to describe teeth.

There has always been some difference in the use of certain terms among authors who were writing from a comparative dental standpoint and those who were using strictly "human" terms. I refer particularly to the terms "canine" and "premolar" as being synonymous to "cuspid" and "bicuspid." However, there is no confusion in the use of these different terms, as each writer knows exactly what the other is talking about.

It therefore remained for the editors of the seventh edition of Tomes' "Dental Anatomy," which I have before me, to confuse the dental terms, as we have been accustomed to use them. On page eight, second line, we read, "The interstitial surfaces are named 'Proximal' and 'Distal'." From a footnote on the same page, we quote the following: "The terms 'mesial' and 'distal' which are in general use clinically are used in relation to the middle of the mouth, but the terms 'proximal' and 'distal' are here suggested in reference to the articular ends of the jaws as being more in accordance with anatomical usage."

The editors admit that the terms "mesial" and "distal" are in general use, and nothing so much as usage makes terms correct. Any word really means what the general public understands by it. In America, we have long considered the mesial side of a tooth to be the side toward the median line of the arch, and the distal side away from the median line of the arch. According to the editors of the book in question, they have taken the word "proximal" to mean "near the articular end of the bone." The term "proximal" in dental anatomy has been used by the dental profession, and is defined in the New Standard Dictionary as being synonymous to "proximate," which term has reference to the surfaces of teeth which touch surfaces of other teeth in the same arch. Therefore, the mesial and distal surfaces of all the teeth, with the exception of the distal surfaces of the third molars, are also proximal or proximate surfaces.

Now comes Tomes' "Dental Anatomy" and they tell us that the distal surface of a tooth is the one away from the articular end of the jaw. No, they do not tell us that, but they say "the terms 'proximal' and 'distal' are here suggested in reference to the articular ends of the jaws." I beg to ask: which is the articular end of the maxillæ? Is not the intermaxillary suture as much of an articular end of the bone as is the palato-maxillary suture? In fact, the mesial surface of the upper first incisor (American nomenclature) is closer to the articular end of the jaw or suture than any other tooth. It is also a well-known fact among embryologists, that the mandible develops from a right and left part. There is a suture or articulation at the median line, which becomes firmly attached in man, but in most of the other mammals always remains as a suture or articulation. Therefore, it is a disputed question as to whether the editors of Tomes' "Dental Anatomy" have used the terms "proximal" and "distal" in the correct anatomical manner, for the incisors are nearer the articulation of the bone than are the molars.

The usage of the terms "proximal and "distal", as set forth in the above mentioned volume, is very confusing and conflicting with our understanding of the terms. In fact, they make "distal" mean what we have always understood by "mesial."

They say, "The distal (median) side, by which it is contact with its fellow, is a little longer than the proximal, so that the distal angle of the

crown is a little lower and, as a necessary consequence, a little more acute than the proximal angle of the cutting edge." This description is given for an upper incisor. The side which they call "distal" has been described by Thompson, Black and Broomell as "mesial."

The average dentist reading the description as quoted above, would be greatly confused. First, because the term distal is used where mesial has always been employed in this country and, second, because proximal is used as referring to the posterior or distal side of the tooth, whereas in this country proximal has been used as having the same meaning as proximate, and both the mesial and distal sides of teeth are proximal sides.

In describing the labial surface of an upper incisor, an American teacher of anatomy would probably say, "the mesio-incisal angle is more acute than the disto-incisal," and at least some would know what he was talking about.

To describe the median surface of an upper incisor as the distal would so confuse the dental student in America as to cause him to imagine he was suffering from the after-effects of having celebrated a great football victory of his school.

If I felt sure that the terms as suggested were anatomically correct, I would be "for them," but for reasons quoted, I do not think they are. I am certain that they are opposed and carry a different meaning from what we have been accustomed to and am therefore "agin them."

I believe that the terms "mandibular" and "maxillary" are more anatomically correct than "upper" and "lower" and shall accept and use them, because they do not imply a different meaning than that which we have always known.

I believe in new terms that are more suggestive of what we are talking about. I prefer a "Jitney" to a "Taxi" both in terms and practice, but I do not believe that the median side of a central incisor should be called the distal side. —*M. D.*

Boston's Opportunity.

BOSTON has again proven to the world her right to be looked upon as the center of culture, philanthropy and science. The establishment in her midst of the Forsyth Dental Infirmary for Children, the formal opening of which took place November 24, 1914, marks an epoch in dental advancement. The wisdom of the Forsyth brothers in establishing this infirmary cannot be questioned. The examination of children in the Boston public schools discloses startling evidence of the needs of such an institution. 98,000 pupils out of 118,000 examined had obviously defective teeth, defective nasal breathing, hypertrophied tonsils, defective palates and diseased cervical glands. Most, if not all of these cases, are amenable to dental and oral treatment.

It is safe to say that the children attending the Boston schools are little or no different from those attending schools in other cities and rural districts and as thorough an examination of children in these schools would surely disclose equally as high a percentage of dental defects as was found in Boston.

Medical and dental state boards should become aroused to this crying need of our child-life. They should advocate the establishment of dental clinics in public schools, not alone in the large cities but wherever possible in rural communities. Philanthropists should be acquainted with this appalling condition and correctly informed with reference to the effect these defects may have upon the efficiency of our race.

Not long since, the gift of one philanthropic millionaire aroused America to the danger of hookworm infection throughout the South. Since that time educators, state boards of health and civic bodies have carried on a campaign to eradicate this scourge from the land. As a result of this effort human efficiency in the South has been greatly augmented. It is questionable whether there was a higher percentage of hookworm infection in any Southern community than of dental defects to be found today in any city or rural district.

It is safe to say that interest in this vital question will continue to grow. Surely other philanthropists will emulate the example set for them by the Forsyth brothers and surely other cities will not allow Boston to long remain the only city to thus securely safeguard the health and future efficiency of her children. But now that Boston has this infirmary, will she make the most of it? Will she utilize this wealth of clinical material? Will she take advantage of this opportunity to observe, tabulate and publish to the world the result of her effort in this direction?

There is no doubt that many medical clinics in our large cities are not increasing our knowledge of disease as they should, because the material at hand in these clinics is not properly utilized. Records are not kept, careful observation is not made and tabulated, pathological findings and post-mortem results are not carefully worked out and recorded with a view of leaving imperishable and valuable data to guide and instruct future internists and surgeons.

It is to be hoped that the wealth of material which is sure to be at the disposal of the workers in the Forsyth Dental Infirmary will be so utilized that dental science throughout the world will be enriched and society greatly benefited thereby.

Shall A Medical Practitioner Extract Teeth.

IT IS hoped the general practitioner of medicine in rural communities at the present places more value upon a tooth than many of them did in times past. Not long since the tooth forceps was a necessary part of the office equipment of most country physicians. Many a molar that should have been preserved has been sacrificed at this shrine of ignorance.

Let us suppose that a patient, young or old, was suffering with the toothache. After enduring the pain as long as could be borne, the family physician was called in or a trip made to his office. There the sufferer was seated in a chair, told to grasp the bottom rung as tightly as possible and open the mouth. Then the tooth was removed, either as a whole or in part, the oral cavity flushed with water from a rusty tin dipper, a fee of twenty-five cents paid for the operation and the patient sent away, rejoicing in

the thought that he had one less tooth to bother him. Such practice might have been condoned in the days when the oxcart or stage coach was the only means of transportation and when medicine was no further developed than transportation, but if such a practice exists anywhere today, the offending practitioner should be hunted down and his license revoked.

Human efficiency has been lowered and life shortened by the ruthless destruction of teeth at the hands of the practicing physician. In the past medical students were given little or no instruction with reference to the teeth and the important rôle which their proper care assumes in maintaining the desired standard of health. Even at this day, few if any of our medical universities pay but slight attention to this subject. A lecturer on medicine may now and then state in his talk on rheumatism or endocarditis, that the great predisposing cause that brings about these conditions is diseased teeth, but seldom does he take an hour during the entire year and devote it to lecturing on the teeth and their relationship to good health.

In the past medical students were wont to look with more or less contempt on the student of dentistry and it may not be out of place to say here that this feeling was maintained even after the medical student completed his course and entered upon his duties as a practitioner of medicine. Is it any wonder then that he naturally looked with more or less contempt upon the teeth and the work of the dentist? Possibly the number of teeth had something to do with their ruthless sacrifice, an analogy borne out by the sacrifice of soldiers during the present European war.

Would it not be well for the dentist to enter upon a campaign of education among the older members of the healing art practicing in the rural districts who are known to have a predilection for the destruction of the teeth, and would it not be advantageous for our medical colleges and universities to give sufficient instructions to their graduating classes on the teeth and the rôle they play in maintaining health to a high standard of efficiency?

A tooth should be looked upon by a physician as a valuable health asset and should never be sacrificed by him.

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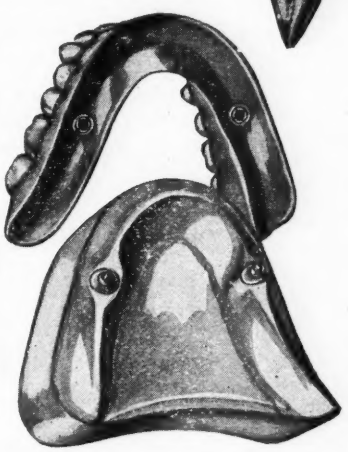

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ORTHODONTIC NEWS AND NOTES

This Department is in charge of Dr. H. C. Pollock, 808-809 Metropolitan Building, St. Louis. To avoid delay, communications in regard to notes should be sent direct.

The Winter Meeting of the Alumni Society of the Dewey School of Orthodontia will be held at the Hotel Baltimore, Kansas City, Mo., February 23, 24, 25 and 26. The program, in part, is as follows:

Joseph E. Johnson, Louisville, Ky.—"Malocclusion in Young Children."

Friedrich Hecker, Kansas City, Mo.—"Rickets as a Causative Factor in Malocclusion."

M. N. Federspiel, Milwaukee, Wis.—"Oral Surgery." (Four lectures.)

H. C. Poliock, St. Louis, Mo.—"Orthodontia."

W. A. Coston, Topeka, Kansas—"Orthodontia in General Practice."

T. G. Duckworth, San Antonio, Texas.—"X-ray Photography."

W. A. McCarter, Topeka, Kansas—"Orthodontia in Small Communities."

S. J. Renz, Kansas City, Mo.—"The Preventative Treatment of Malocclusions."

W. G. Barr, Wichita, Kansas—Subject not announced.

Martin Dewey, Kansas City, Mo.—(1) "The Loop Appliance;" (2) "The Development of the Maxillae."

There will be some additions to this program not yet announced, the program committee not being able at this time to announce some prominent men who are expected to contribute papers at this meeting. The banquet will be held Friday night, February 26th, at Hotel Baltimore. Also included in the above program will be clinics and reports of cases. All those interested in the science of orthodontia are invited to attend the meeting. Hotel reservations may be made by advising Dr. Martin Dewey, 1016 East Armour Blvd., Kansas City.

W. A. McCARTER,
Chairman of Program Committee.

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Orthodontia Appliances by Mail Order.—I cannot help but voice my cry against a field of abuse which is already moving with the marvelous rapidity of gross insult to the fundamental principles of an almost exact science—one which within two decades has produced results enough to satisfy the extreme pessimist relative to its wonderful possibilities. I refer to orthodontics. Strange as it may seem, although this specialty has contributed volumes of dental literature regarding its methods of diagnosis, treatment, and prognosis, it has nevertheless failed miserably in being immune to orthodontic abuses. Its field is already invaded by the so-called *orthodontic mail-order laboratory specialist* who tempts the dental practitioners to regulate irregularities of the teeth with appliances fitted to crude models, regardless of conditions which necessitate extreme care in obtaining a comprehensive understanding of the etiology, diagnosis, and prognosis. Such methods cannot help but sow the seed of discontent among practitioners and thus retard the teachings of true orthodontic knowledge.—*M. N. Federspiel, Dental Review.*

* * * *

Free Dental Clinics for School Children.—The system of dental clinics now conducted by the Department of Health of New York City is a direct extension of the first Municipal Dental Clinic founded and maintained through the energy of the Honorable Peter T. Barlow, Magistrate of the City Court. The clinic was situated at 449 East 121st Street, New York City. The Department of Health took over this clinic about April 1, 1913. Subsequently a completely equipped dental clinic which had been operated by the Brooklyn Bureau of Charities was donated to the Department of Health and installed at 124 Lawrence Street during the summer of 1914. Additional dental clinics have been established as follows: 330 Throop Avenue, Brooklyn; 1249 Herkimer Street, Brooklyn; 580 East 169th Street, The Bronx; 164 Second Avenue, Manhattan, and 689 Bay Street, Staten Island.

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The Golden Jubilee Meeting of the Missouri Dental Association.—Has been postponed until June 10, 11 and 12. Elaborate preparations are being made to celebrate the Semi-Centennial meeting of this Association on an elaborate scale. See special announcements in the next issue of the Journal. For information, address S. C. A. Rubey, secretary, 1017 New York Life Bldg., Kansas City, Mo.

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Dr. E. G. Weeks (practice limited to orthodontia), announces his location in Saginaw, Michigan.

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Dr. Geo. F. Burke, whose location has been the Stevens Bldg., Detroit, Michigan, expects to remove his offices this month into the new David Whitney Bldg., and in the future will devote his entire time to the practice of orthodontia.

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Dr. L. M. Waugh, formerly of Buffalo, N. Y., and professor of pathology, dental department, University of Buffalo, has opened offices at 76 Fifth Avenue, New York City. His practice will be limited to orthodontia.

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Drs. Fred W. McDonald and F. A. Flett, of Detroit, will open their offices in the new David Whitney Bldg., their former location having been in the Scherer Bldg.